MONTECH®

Handling Components

SERVOLINE

USER MANUAL
SETUP SOFTWARE
VERSION I/O

BA-100040

Edition 04/08

Change index

Editions issued so far:

Edition	Comments	Order number (English version)
02/01	First edition, valid from software version 2.00	507002
07/01	Title page, new: Edition 07/01	507002
07/01	Header new: Edition 07/01	
07/01	Page 2-22 Chapter 2.5.1. Additional text under "Outside pos.1 and pos. 2“	
07/01	Page 2-24 Chapter 2.6.1. Plug X11B/ terminal 4 new: PosReg 4 (Next-InPos) Plug X11B/ terminal 5 new: FError negated Plug X11B/ terminal 10 new: PosReg 3, High-aktive	
07/01	Page 2-25 Chapter 2.6.1.2. 4, PosReg 4 (Next-InPos) additional text 5, new: Ferror negated	
07/01	Page 2-26 Chapter 2.6.1.2. New 8...10, PosReg 1...3	
07/02	Chapter 2.4.4.1 Motion task is ABS or REL... Chapter 2.6.1.2-4 If "Outside pos. 1 and pos. 2" is active, then the function Next-InPos on X11B/4 is inactive Chapter 2.15.1 Changes and new software limit switches values Chapter 2.15.2 Changes and new values Chapter 2.16.4 New default values Chapter 2.18.2 SSI code function is binary or GRAY	507002
02/06	New article number	BA-100040
04/08	New Vista	BA-100040 A

1. GENERAL ..... 1—1

1.1 Introduction ..... 1—1

1.2 "Use as directed" ..... 1—2

1.3 Software description ..... 1—2

1.4 Operating systems ..... 1—3
1.4.1 Microsoft WINDOWS Vista, XP, 2000, NT, ME, 98, 95 ..... 1—3
1.4.2 DOS, OS2, WINDOWS 3.xx ..... 1—3

1.5 Hardware requirements ..... 1—3

1.6 Installation under Microsoft WINDOWS Vista, XP, 2000, NT, ME, 98, 95 ..... 1—4

1.7 Software operation ..... 1—5
1.7.1 General ..... 1—5
1.7.2 Function keys ..... 1—5

1.8 Software structure ..... 1—6

1.9 Screen layout ..... 1—7

2. PARAMETERS AND FUNCTIONS ..... 2—9

2.1 Screen page «Communication» ..... 2—9

2.2 Software structure (open area) ..... 2—10

2.3 Screen page «Linear axis» ..... 2—11

2.4 Screen page «Position data» ..... 2—13
2.4.1 Field «Status messages» ..... 2—13
2.4.2 Table «Motion tasks» ..... 2—14
2.4.3 Screen page «Next motion task» ..... 2—15
2.4.4 Field «Setup» ..... 2—17
2.4.5 Field «Motion task» ..... 2—20
2.4.6 Message ..... 2—20
2.4.7 Field «Reference traverse» ..... 2—21

2.5 Screen page «Threshold- / cam function» ..... 2—22
2.5.1 Position registers ..... 2—22

2.6 Screen page "I/O digital X11" ..... 2—24
2.6.1 Digital inputs and outputs, expansion card X11A/B ..... 2—24

2.7 Screen page «digital I/O X3» ..... 2—26
2.7.1 Digital inputs DIGITAL-IN1 / DIGITAL-IN2 / PSTOP / NSTOP ..... 2—27
2.7.2 Digital outputs DIGITAL-OUT1 / DIGITAL-OUT2 ..... 2—30

2.8 Screen page «Status» ..... 2—32
2.8.1 Error messages ..... 2—33
2.8.2 Warnings ..... 2—34

2.9 Screen page «Actual values» ..... 2—35

2.10 Screen page «Info» ..... 2—36

2.11 Software structure (password-protected area) ..... 2—37

2.12 Enter password ..... 2—38

2.13 Screen page «Linear axis» (password-protected area) ..... 2—39

2.14 Screen page «Change password» ..... 2—39

2.15 Screen page «Limit values» ..... 2—40
2.15.1 Software limit switches 1 and 2 ..... 2—40
2.15.2 Limit values ..... 2—41

2.16 Screen page «Settings» 2—42
2.16.1 Field bus 2—42
2.16.2 InPosition behaviour 2—43
2.16.3 Operation mode 2—44
2.16.4 Loading default values 2—44
2.17 Screen page «Electrical gearing» 2—45
2.18 Screen page «Encoder emulation» 2—46
2.18.1 ROD 2—47
2.18.2 SSI 2—48
2.19 Screen page «Feedback» 2—49

3. APPENDIX 3—50
3.1 Abbreviations and acronyms 3—50
3.2 Glossary 3—51
3.3 Index 3—52

1. General

1.1 Introduction

This manual explains the installation and handling of the setup software for the digital servo amplifier (Version I/O). The information is broadly arranged as follows:

- Chapter 1: General information / installation / screen layout / operation
- Chapter 2: Parameter description
- Chapter 3: Glossary, index

This manual forms part of the complete documentation of the SERVOLINE® products. The complete documentation consists of the following documents:

Description	Ref. No
• Connection to automation systems (version I/O)	BA-100038
• Setup software (version I/O)	BA-100040
• Servo amplifier (version I/O)	BA-100039
• Mechanical design of the SERVOLINE® products	miscellaneous

The documentation is available in the following language versions: German, English, French, Italian, Spanish and Swedish.

- **Please read this documentation before commencing with setup.** Incorrect handling of the servo amplifier can lead to personal injury or material damage and render the warranty void. It is vital that you keep to the technical data and information on connection requirements.

- A basic knowledge of the operating system WINDOWS and of the use of a personal computer is assumed. Strictly observe all instructions relating to safety, installation and setup.

- **Only properly qualified personnel are permitted to perform activities such as installation, setup and maintenance.** Properly qualified persons are those who are familiar with the assembly, installation, setup and operation of the product, and who have the appropriate qualifications for their job. The qualified personnel must know and observe the following standards or guidelines:

  IEC 364 and CENELEC HD 384 or DIN VDE 0100
  IEC report 664 or DIN VDE 0110
  National accident prevention regulations or VBG4

1.2 “Use as directed”

The setup software is intended to be used for altering or storing the operational parameters of the servo amplifier of the SERVOLINE® products. The servo amplifier that is connected is commissioned by means of the software - whereby the drive can be directly controlled by the setup and service functions. Due to the characteristic nature of a PC, these functions do not provide operational safety without further measures. A PC program might unexpectedly be disturbed or stopped, so that in the event of a malfunction, any movements that have already been initiated can no longer be stopped from the PC.

The equipment manufacturer is obliged to prepare a hazard analysis of the equipment, and is also responsible for functional, mechanical and personal safety aspects in relation to the machine. This applies especially to the initiation of movements by way of functions in the setup software.

Sets of data that are stored on data media are not safe from unintended alteration by third parties. **After a set of data has been loaded, all parameters must always be checked** before the servo amplifier is enabled.

Servo amplifiers are components that are built into electrical equipment or machinery; they must only be operated as integral components of such equipment.

The BTB contact must be wired into the safety loop of the system. The safety loop as well as the stop and emergency stop functions must comply with the requirements of EN60204, EN292 and VDI2853.

Before operating the servo axes, all work is to be carried out as specified in the operator manuals of the servo amplifier and the Servoline axes. Strictly observe all safety regulations.

- Assembly, installation, wiring and **final check have been carried out according to the operator manual for the servo amplifier.**
- Assembly, installation, wiring and **final check have been carried out according to the operator manual for the servo axes.**

1.3 Software description

The servo amplifier has to be adapted to the conditions of the application (target position, acceleration, speed etc.). Such parameterisation is not carried out on the amplifier itself but on a PC by means of the setup software. The PC is connected (in series) to the servo amplifier via a null-modem cable. The setup software establishes communication between the PC and the servo amplifier.

With very little effort, you can alter parameters and instantly see the effect on the drive, since there is a permanent (online) connection to the amplifier. Important process values / actual values are simultaneously read out from the amplifier and displayed on screen.

You can store (archive) sets of data on a data carrier and load them again. The data set currently in use can be printed.

1.4 Operating systems

1.4.1 Microsoft WINDOWS Vista, XP, 2000, NT, ME, 98, 95

The setup software runs under Microsoft WINDOWS Vista, XP, 2000, NT, ME, 98, 95.

1.4.2 DOS, OS2, WINDOWS 3.xx

The setup software **will not run** under DOS, OS2 or Windows 3.xx.

Emergency operation is possible with ASCII terminal emulation (no user interface).
Interface settings: **9600 baud, 8 bit, 1 stop bit, no parity, no handshake**.

1.5 Hardware requirements

Minimum specifications of the PC:

Processor:	Intel Pentium or higher
Operating system:	Microsoft WINDOWS Vista, XP, 2000, NT, ME, 98, 95
Graphics card:	Windows-compatible, colour
Resolution:	800 x 600 pixels minimum
Drives:	CD drive
	Hard disk (5 MB free space)
Main memory:	8 MB minimum
Interface:	One free serial interface (COM1: or COM2:)

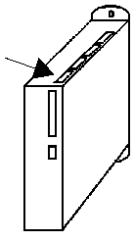
The interface must not be used by any other software (driver or similar).

1.6 Installation under Microsoft WINDOWS Vista, XP, 2000, NT, ME, 98, 95

Connect or disconnect the interface only if all the supply voltages (amplifier and PC) have been switched off.

On the CD you will find an installation program with the name **SETUP.EXE** which makes it easier for you to install the setup software on your PC.

Connection to the serial interface of the PC:



Connect the interface cable to a serial interface of the PC (COM1 or COM2) and to the PC interface (X6) of the servo amplifier.

Switch-on:

Switch the PC and the monitor on.
When the boot phase has finished, the Windows user interface appears on screen.

Installation:

Click on **START** (taskbar), then on Run. Enter the program call: **a:\setup.exe** (where “a” is the correct drive letter).
Confirm by pressing **OK** and follow the instructions.

Setting up the graphics card (font size)

Click on the desktop with the right mouse button. The dialog window “Properties” appears. Select the file card “Settings”. Set the font size to “Small fonts”. Follow the instructions provided by the system.

1.7 Software operation

1.7.1 General

The setup software is basically used in the same way as other Windows programs.

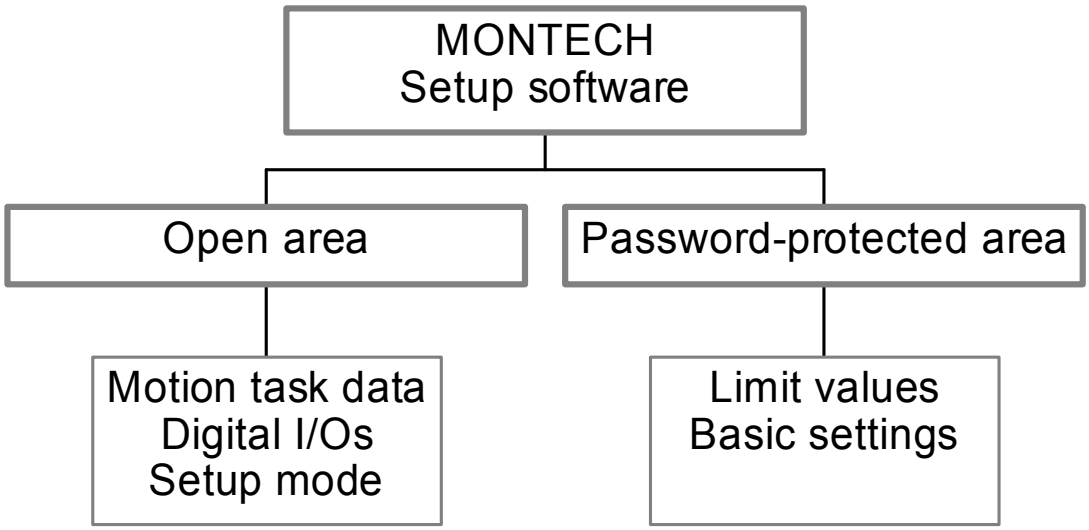
Note that after any parameter alteration on a screen page, you must first click on **APPLY** so that the parameter is transferred to the RAM of the servo amplifier. (Pressing the “Return” key after altering a parameter value also has the effect of transferring the parameter set to the RAM of the servo amplifier). Only then should you leave the page. If a reset of the servo amplifier is necessary to activate a function, this is recognised by the software which will carry out a reset after a software confirmation request.

The currently valid data set must be saved in the EEPROM of the servo amplifier in order to be permanently stored. Therefore execute the **Save Data to EEPROM** function on the “Linear axis” page (➔ chapter 2.3) before the servo amplifier switches off or before processing of the data set has been completed.

1.7.2 Function keys

Function key	Function	Comment
F1	Help	Contextual help, in preparation
F2	Not used	Not used
F3	Not used	Not used
F4	Not used	Not used
F5	Not used	Not used
F6	Teach-in (F6)	Teach-in function for: • Positioning data → motion task position s_cmd [µm]
F7	Teach-in (F7)	Teach-in function for: • Threshold function/cam function → positions 1 and 2 • Limit values → Software limit switch positions 1 and 2
F8	Not used	Not used
F9	STOP (Off)	Emergency stop
F10	Not used	Not used
F11	Not used	Not used
F12	Disable	Disable the output stage via software
Shift + F12	Enable	Enable the output stage via software

1.8 Software structure



Open area

The open area of the software provides the user of the linear axis with the option of changing any of the relevant operation-specific data while meeting the limit values defined by the equipment manufacturer. This can be the case when setting up the equipment for a different product. The user of the equipment is thus able to carry out the required changes.

The following changes may be made:

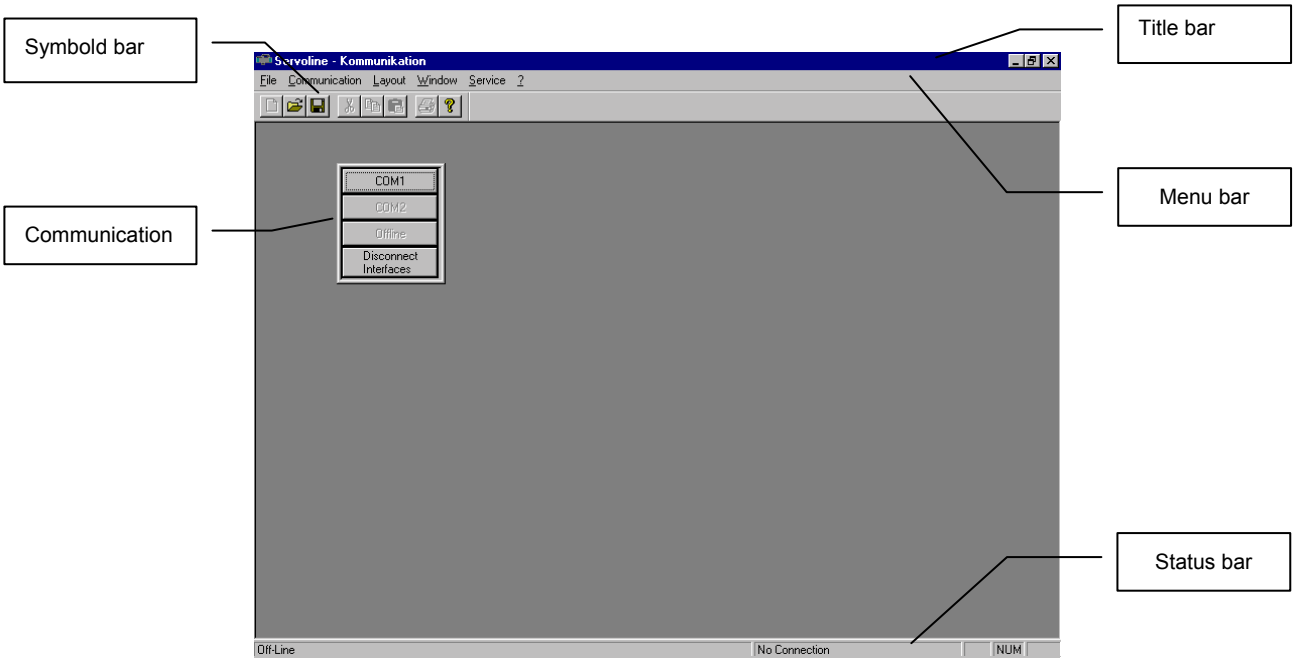
- Opening and saving data on a hard disk/diskette. Only data of the respective type of linear axis can be loaded.
- Motion task data. Input values within the limit values specified in the pasword-protected area.
- Setup operation.
- Threshold function and cam function.
- Function of the digital I/Os.

Password-protected area

In the password-protected area of the software the equipment manufacturer can define equipment-specific limit values. The operator of the equipment is thus unable either not to reach, or to exceed, the limit values.
The following additional changes can be made:

- Erasure of the EEPROM.
- Loading default data or special solutions from hard disk/diskette.
- Limit values: maximum traversing rate, acceleration, emergency stop ramp, following errror and I2tmessage.
- Software limit switch positions.
- Operation mode (master-slave or position mode), encoder emulation, electrical gearing, feedback system, in-position behaviour.

1.9 Screen layout



Title bar The program name, the station address as well as the name of the currently valid data set (amplifier) are displayed in the title bar.

Toolbar

Typical Windows-style buttons provide direct access to individual functions.

Status bar

Shows current information on data communication.

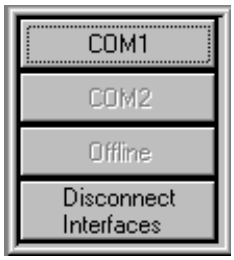
Menubar

FILE	
Open	A parameter or motion task data set is read from the data medium (hard disk, diskette). Only data of the same type of linear axis can be opened.
Close	The current data set is closed and not saved.
Save	Saves the current parameter and/or motion task data set to a data carrier (hard disk, diskette) while keeping the file name, if the data set already has a name. If the data set has yet not been named, you will be prompted to enter a name and storage location.
Save as	Saves the current parameter and/or motion task data set to a data carrier (hard disk, diskette). You will be prompted to enter a name and storage location.
Print	The current data set will be printed out. You can choose whether to send the print data to the system printer or save it to a file.
Print preview / Print setup	Use these functions in the same way as for any other Windows software.
Exit	Terminates the program.
COMMUNICATION	
COM1/COM2	If one of these interfaces (ports) is available for communication with a servo amplifier, i.e. if it is not being used by any other equipment or drivers, then the text label appears in black and can be selected. Select this interface and use it for connecting to the servo amplifier.
Offline	In preparation
Deactivate interfaces	This deactivates access to the setup software from interfaces COM1 and COM2. (chapter 2.1)
Multi drive	
EDIT	
Undo / Select line / Cut / Copy / Paste / Delete	Use these functions in the same way as for any other Windows software.
VIEW	
Toolbar / Status bar	Switch to show or hide the toolbar (top) or the status bar (bottom) on the screen.
WINDOW	
Cascade / Tile vertically / Arrange icons	Use these functions in the same way as for any other Windows software.
SERVICE	
STOP (F9)	Stops any motion task functions that are currently active.
?	Device information

2. Parameters and functions

This chapter describes all the parameters that can be accessed via the setup software.

2.1 Screen page «Communication»



COM1, COM2 If one of these interfaces (ports) is available for communication with a servo amplifier, i.e. if it is not being used by other equipment or drivers, then the text label appears in full black and can be selected. Use this interface for connecting to the servo amplifier.

- Select the interface which you are using.
- The status bar shows the status of communication with the servo amplifier.
- If communication is working properly, the parameters stored in the servo amplifier are read into the PC.
- A dialog window keeps you up to date.

Offline In preparation.

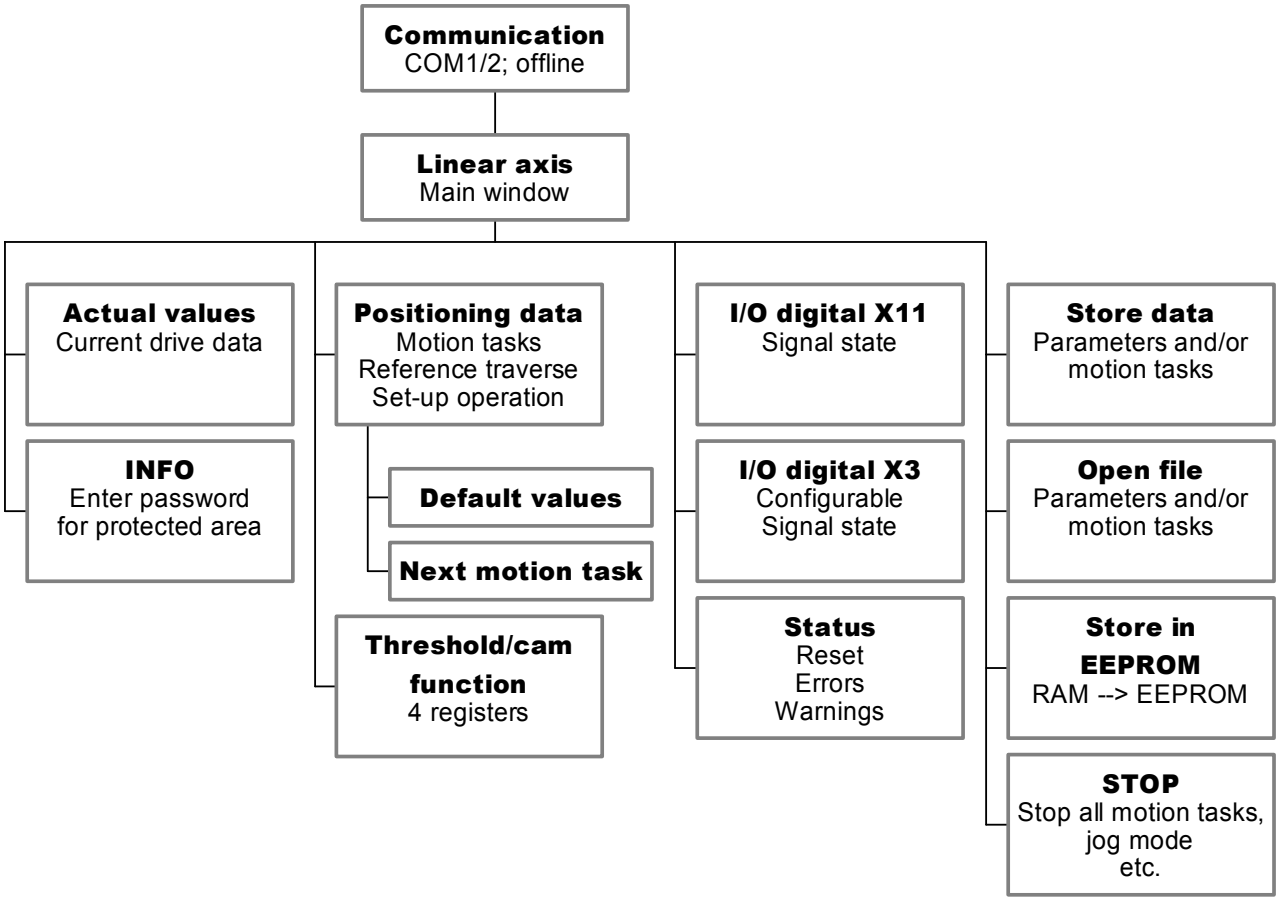
Deactivate interfaces This deactivates access to the setup software from interfaces COM1 and COM2.

2.2 Software structure (open area)

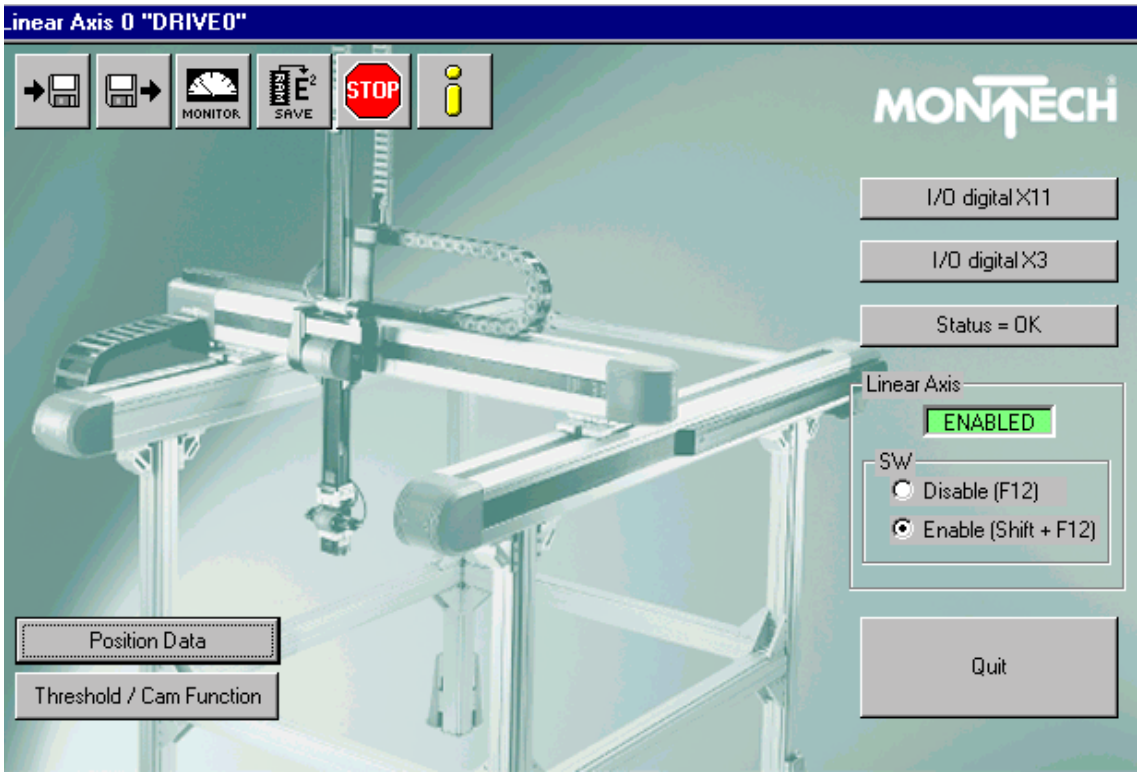
The open area of the software provides the user of the linear axis with the option of changing any of the relevant operation-specific data while meeting the limit values defined by the equipment manufacturer. This can be the case when setting up the equipment for a different product. The user of the equipment is thus able to carry out the required changes.

The following changes may be made:

- Opening and saving data on a hard disk/diskette. Only data of the respective type of linear axis can be loaded.
- Motion task data. Input values within the limit values specified in the pasword-protected area.
- Setup operation.
- Threshold function and cam function.
- Function of the digital I/Os.



2.3 Screen page «Linear axis»



Click with the left mouse button on a button on the screen page to call up the respective function or screen page.

Saves current parameters to a data carrier (hard disk, diskette). It is possible to save control parameters and motion task parameters in separate files.

Loads a parameter file or motion task file from a data carrier (hard disk, diskette). Only data records of the respective linear axis can be loaded.

Opens the screen page «Actual values» to display the actual drive status.
(➔ chapter 2.9)

Non-volatile storage of the currently valid parameter set, in the EEPROM of the servo amplifier. In this way, all the parameter changes made since the last switch-on / reset of the servo amplifier, can be permanently saved.

Stops (cancels) motion functions (motion task, homing).

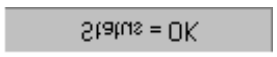
Opens the screen page «Instrument info» to display the hardware and software versions.
(➔ chapter 2.10)

Opens the screen page «Position data» (➔ chapter 2.4)

Opens the screen page “Threshold-/cam function” (➔ chapter 2.5)

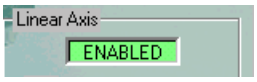
Opens the screen page “I/O digital X11” (➔ chapter 2.6

Opens the screen page “I/O digital X3” (➔ chapter 2.7)



Opens the screen page “Status” (➔ chapter 2.8)
If a fault is present, the text of the button changes.

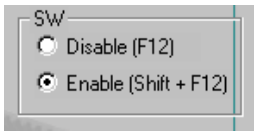
- **Status = OK**
- **Error**
- **Warning**



Shows the enable status of the amplifier

- **Enable**
- **No Hardware Enable**
- **No Software Enable**
- **No Enable**
- **Offline**

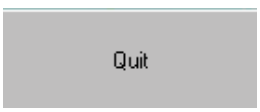
Software Disable/Enable:



Disables or enables the servo amplifier via the software. This signal is logically “And”-linked inside the servo amplifier with the hardware enable (terminal X3/15).
Disabling and enabling can also be undertaken via the function key F12 or Shift+F12.

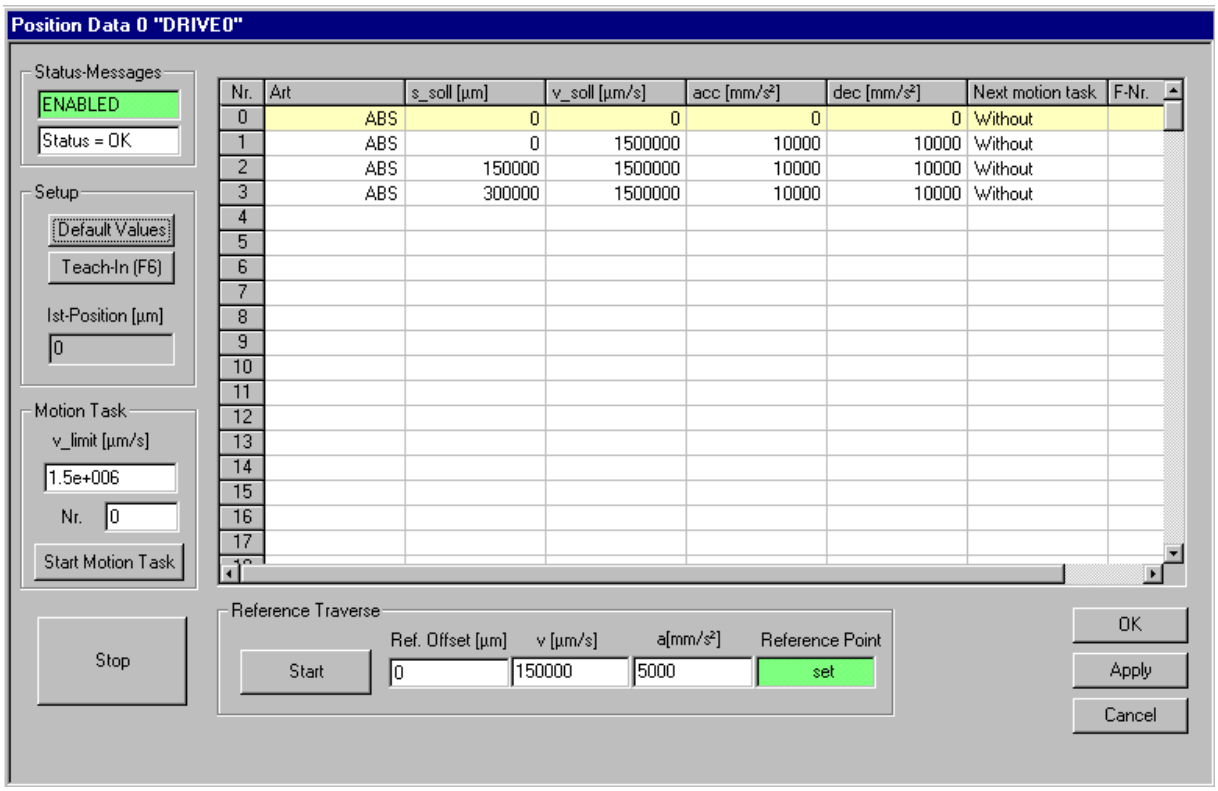
This function does not ensure personnel safety. To disable the servo amplifier so as to ensure personnel safety, the enable signal (terminal X3/15) must be removed and the line (mains) power must be switched off.

End processing:



Ends processing of the current parameter set. If you have made any changes, you will be asked if you want to save the data.

2.4 Screen page «Position data»



2.4.1 Field «Status messages»

Upper field: Shows the enable status of the amplifier

- **Enable**
- **No Hardware Enable**
- **No Software Enable**
- **No Enable**
- **Offline**

Lower field: Shows the error status of the amplifier

- **Status = OK**
- **Error**
- **Warning**

2.4.2 Table «Motion tasks»

For each of the positioning tasks, you will need to specify a motion task. These motion tasks can be selected via a motion task number, and are stored in the servo amplifier. The motion task No. 0 is a direct order and can be described or executed only via field bus systems.

Motion task number	Stored in	Precondition for storing	Comments
1...180	EEPROM	Output stage disabled	Permanently stored
0, 181...255	RAM	None	Volatile storage

Entries in the table can only be made after activating the Enter key. To complete the entry, press the Enter key again. The data are stored in the EEPROM only after you click on the Accept button.
The following functions are available for editing motion tasks:

Functions	Keyboard	Menubar	Mouse
Select line	Ctrl+A	Edit → Select line	Right mouse key → Select line
Cut	Ctrl+X	Edit → Cut	Right mouse key → Cut
Copy	Ctrl+C	Edit → Copy	Right mouse key → Copy
Paste	Ctrl+V	Edit → Paste	Right mouse key → Paste
Delete	Ctrl+K	Edit → Delete	Right mouse key → Delete

Nr Motion task number.

Type This selection determines whether the motion task is interpreted as a relative or an absolute task.

ABS	movement to an absolute target position, in relation to the reference point.
REL cmd	relative to the last target (setpoint) position (in connection with motion block changeover: e.g. summing operation).
REL act	relative to the actual position at start (in connection with motion block changeover: e.g. register control).
REL InPos	when the load is in the InPosition window: relative to the last target position; when the load is not in the InPosition window: relative to the actual position at start.

s_cmd [µm] This parameter determines the distance to be travelled.

v_cmd [µm/s] This parameter determines the velocity of movement.
If v_limit is later set to a value that is less than v_cmd, the position controller will use the smaller value.

acc [mm/s^2] This parameter determines the acceleration in mm/s^2. (Acceleration ramp sine^2-shaped)

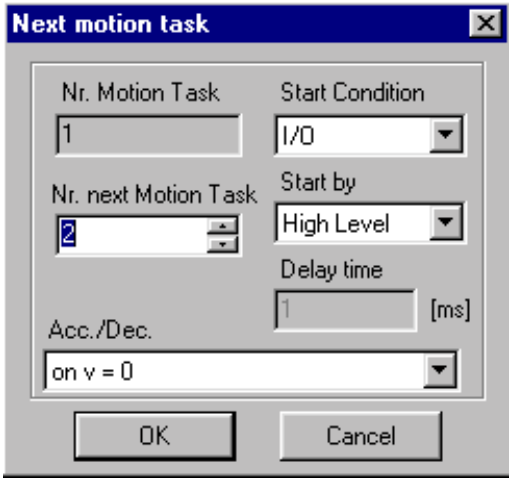
dec [mm/s^2] This parameter determines the deceleration in mm/s^2. (Deceleration ramp sine^2-shaped)

Next motion task Select whether a new motion task should be started automatically, after the present task is finished.

The InPosition signal (Terminal X11B.3) is only enabled when the last motion task (no further task) has been processed. Reaching each target position of a motion task sequence can be queried using the function «Next InPos» (chapter 2.6.1.2) at the digital output (terminal X11B.4).

F-Nr. Displays the number of the next motion task.

2.4.3 Screen page «Next motion task»



No. Motion task Displays the current motion task number.

No. Next motion task Displays the number of the next motion task. On completion of the present task, the next motion task is automatically started, meeting the following conditions:

Start condition

Immediately: The next task is started as soon as the target position is reached.

I/O: The next task is started by a signal at a digital input «FStart_Next» (terminal X11A/11).

Condition: Target position must have been reached.

You can preselect the logic with the “Start with” parameter.

Time: The next task is started with a specified delay after the target position has been reached. You can enter the delay time via the “Delay time” parameter.

I/O or time The next task is started by a signal at a digital input «FStart_Next» (terminal X11A/11) or by a specified delay. The event that occurs first (the start signal or the end of the delay time) provides the trigger.

Condition: The target position must have been reached.

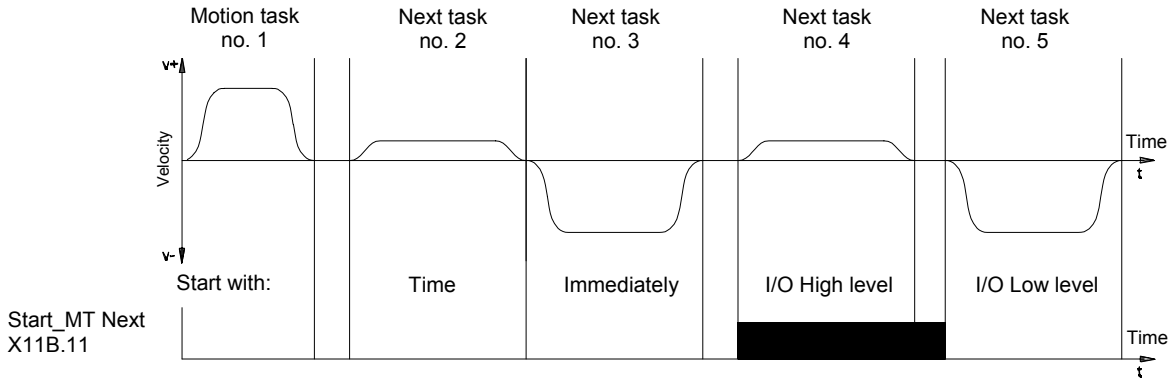
You can preselect the logic with the “Start with” parameter, and enter the delay time with the “Delay time” parameter.

Start with Logic for the digital input (terminal X11A/11) that has the function «FStart_Next»

Low level: 0...7V

High level: 12...30V / 7mA

Delay time Enter the delay time (in ms) between reaching the target position and starting the next task.

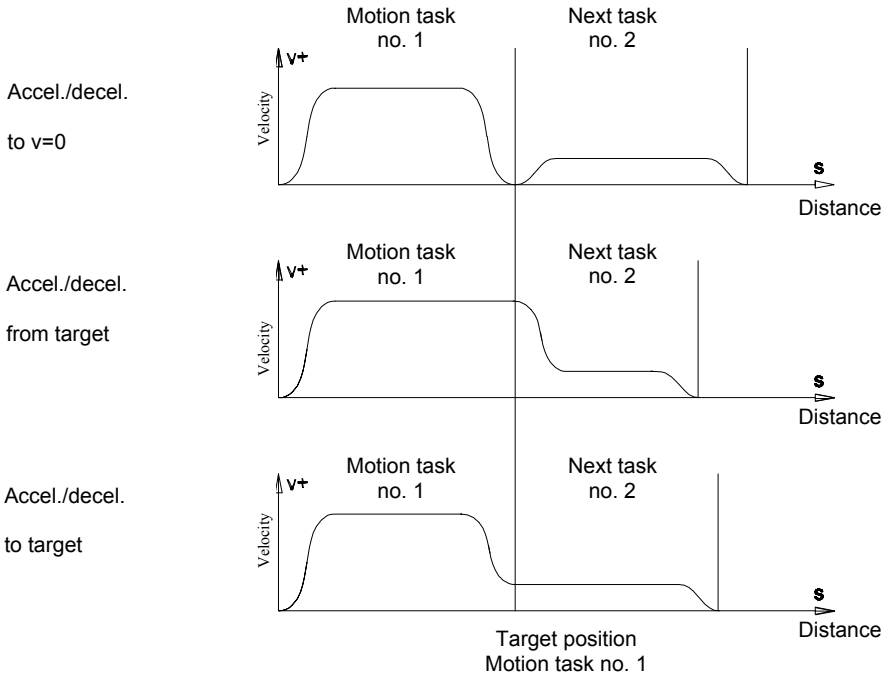


Accel./decel. Select the action to be taken when the target position for the present motion task is reached

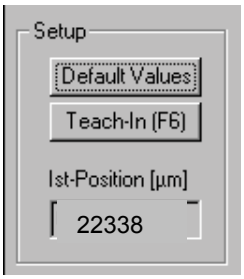
On v=0: The drive brakes and comes to a stop in the target position. The next motion task is then started.

From target: The drive moves at v_cmd of the present motion task to the target position and then accelerates through to v_cmd of the next task. **(Not yet selectable, function v=o is carried out.)**

To target: The changeover to the next task is brought so far forward that v_cmd of the next task has already been reached by the time the target of the present motion task has been reached. **(Not yet selectable, function v=o is carried out.)**



2.4.4 Field «Setup»

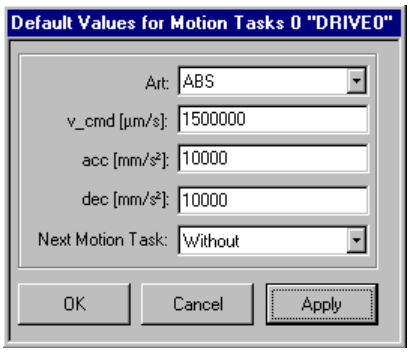


Default values: Open the screen page “Default values” (➔ chapter 2.4.4.1)

Teach-in: Take over the actual position as s_cmd- position of a motion task (➔ chapter 2.4.4.2)

Actual position [µm] Shows the actual slide position in µm.

2.4.4.1 Screen page «Default values»



The default values are used to enter a position (or teach-in) of a motion task which has previously not been specified. The position value entered is automatically supplemented by the default value → Motion task specified.
Motion task data already specified will not be overwritten.

Type This selection determines whether the motion task is to be interpreted as a relative or an absolute task.

ABS	movement to an absolute target position, in relation to the reference point.
REL cmd	relative to the last target (setpoint) position (in connection with motion block changeover: e.g. summing operation).
REL act	relative to the actual position at start (in connection with motion block changeover: e.g. register control).
REL InPos	when the load is in the InPosition window: relative to the last target position; when the load is not in the InPosition window: relative to the actual position at start.

v_cmd [µm/s] This parameter determines the distance to be travelled.
If at a later stage v_limit is set to a value that is less than v_cmd, the position controller will use the smaller value.

acc [mm/s^2] This parameter determines the acceleration in mm/s^2 (acceleration ramp sine^2-shaped).

dec [mm/s^2] This parameter determines the delay in mm/s^2 (acceleration ramp sine^2-shaped).

Next motion task Select whether on completion of the current motion task, a new motion task should be started automatically.

2.4.4.2 Teach-in

With this function, the current position value can be taken over as a position of a motion task (Teach-in).

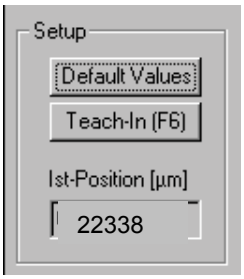
The desired position can either be reached manually by sliding the load, or via the motor (jog mode).

2.4.4.2.1 Teach-in with the output stage disabled (SHA and FP only)

- **Disconnect the supply voltage from the servo amplifier. The main switch or mains contactor is switched off.**
- **Ensure that the supply voltage cannot be switched on by others.**
- **Failure to adhere to these safety measures may result in life-threatening or severe personal injuries or material damage.**

Procedure:

- Disable the output stage (function key F12).
- Switch off the power supply (L1, L2, L3) for the controller.
- If several positions are to be entered at the same speed or acceleration, the speed or acceleration can be entered as a default in the default values window (➔ chapter 2.4.4.1). Existing motion task data **will not** be overwritten.
- Slide the load to the desired position.
- Select a motion task for which a teach-in is to be carried out. Highlight the motion task number.



- Carry out a teach-in by pressing the teach-in key [F6] or by pressing function key F6 on the PC keyboard. The current actual position of the slide is taken over to become the command position for the selected motion task and is displayed accordingly.
- The remaining data of the motion task is taken from the default value settings.

7	ABS	22338	1000000	10000	10000	Ohne / without
8						

- Store the data in the EEPROM by activating the key “Take over“.

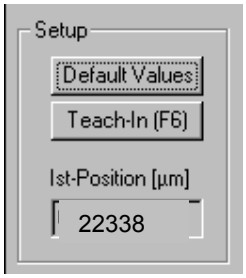
2.4.4.2.2 Teach-in with the output stage enabled

Warning!

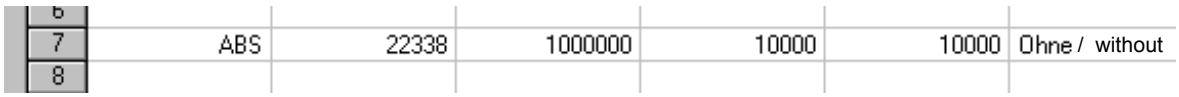
- **Assembly, installation, wiring and final check have been carried out according to the user manual of the servo amplifier.**
- **Assembly, installation and final check have been carried out according to the user manual of the servo horizontal axis.**
- **Ensure that nobody is present within working range of the axis.**
- **During operation, keep all covers, protective devices and switchgear cabinet doors closed. Failure to do so may result in life-threatening or severe personal injuries or material damage.**

Procedure:

- If several positions are to be entered at the same speed or acceleration, the speed or acceleration can be specified as a default in the default window (➔ chapter 2.4.4.1). Existing motion task data will **not** be overwritten.
- Enable the output stage (power supply is On and Enable input is set to High level).
- Via jog mode (➔ chapter 2.7.1.1 function 20, Start_JOGx)) move to the command position.
- Disable the output stage (function key F12).
- Select the motion task for which a teach-in is to be carried out. Highlight the motion task number.

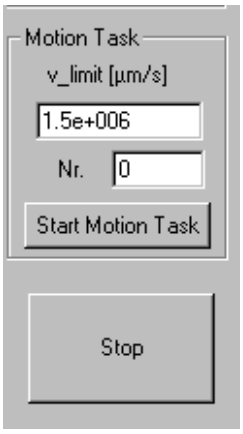


- Carry out a teach-in by pressing the “Teach-in“ key [F6] or by pressing the function key F6 on the PC keyboard. The current actual position of the slide is taken over to become the command position for the selected motion task and is displayed accordingly.
- The remaining data of the motion task is taken from the default settings.



- Store the data in RAM by activating the key “Take over“.

2.4.5 Field «Motion task»



Start a motion task via the setup software. Irrespective of the signal present, the selected motion task is started at the digital inputs (X11A1 to X11A8 and X11B2 ➔ chapters 2.6.1.1 and 2.6.1.2. This mode can be started when the reference point has been set and the motion tasks have been specified.

v_limit [µm/s] During setup, the velocity can be limited with v_limit, without changing the motion task settings.

No. Enter the number of the motion task to be started.

Start motion task Start the motion task whose number appears in the field No.

Stop Stop the current motion task.

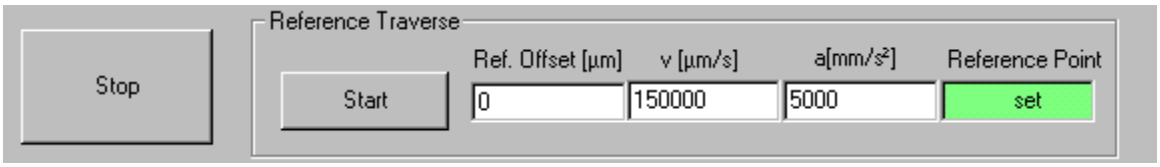
Caution!

- **Assembly, installation, wiring and final check have been carried out according to the operator manual for the servo amplifier.**
- **Assembly, installation and final check have been carried out according to the operator manual for the servo axis.**
- **Ensure that nobody is present within working range of the axis.**
- **During operation, keep all covers, protective devices and switchgear cabinet doors closed. Failure to do so may result in life-threatening or severe personal injuries or material damage.**

2.4.6 Message

This message appears if a drive order is started with the software via the "drive order" field after the reference traverse. This message is also displayed if a drive order was executed with "Start drive order" and then a reference traverse is started via the software. After this message has been acknowledged, the stop key should be pressed so that the drive order can be started.

2.4.7 Field «Reference traverse»



The reference traverse (homing) is an absolute task which is used for zeroing the drive for subsequent positioning operations. After homing, the drive reports “InPosition”, thus enabling the position controller in the servo amplifier.

Warning!

- **The position controller cannot be operated without first carrying out a reference traverse (homing).**
- **After the 24V auxiliary voltage has been switched on, a reference traverse has first to be carried out.**
- **During homing, the start signal (FStart_Nrx) must not be removed. The start signal must be present until the “InPosition” message appears.**

The reference point is set to the first zero-crossing point of the feedback unit (resolver) after the reference switch transition has been detected. The two-pole resolver has exactly one zero-crossing per revolution, thus positioning on the zero mark is unambiguous within a motor revolution.

Ref.Offset [µm] With the reference offset, an absolute position value other than 0 can be assigned to the reference position. With an offset for the reference position, you are not actually making a physical change, but the offset is used as a reference value within the position control of the servo amplifier. Homing to the reference switch will then not finish at zero, but instead at the set reference offset value. The reference offset must be set before homing is started. Any change to the offset will only become effective after a new homing operation. The reference offset is entered in mm.

v [µm/s] Determines the speed for the reference traverse. Factory default is ‘maximum speed’.

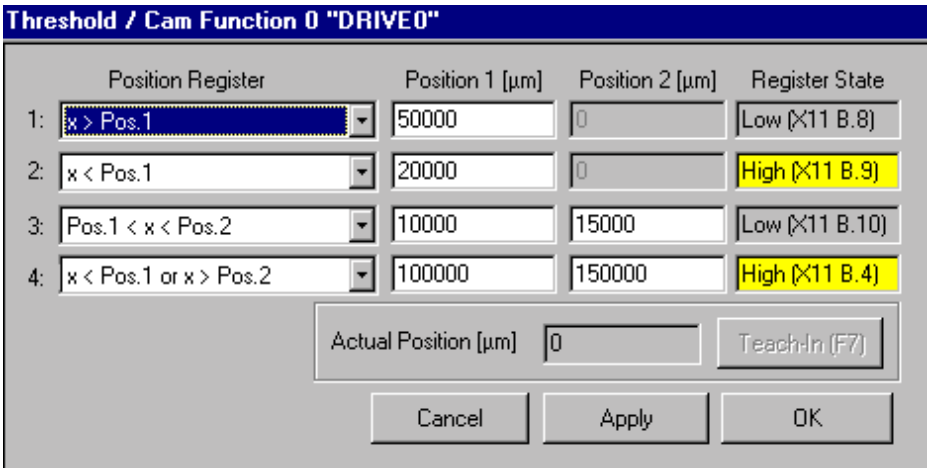
a [mm/s^2] Specifies the acceleration for homing. Enter the value in mm/s^2. The ramp also applies to jog mode. A maximum value has been set as a factory default.

Reference point Indicates whether or not a reference point has been set.

Start Button to start homing.

Stop Button to stop homing. After a reference traverse, the stop key must be pressed so that a drive order can be initiated.

2.5 Screen page «Threshold- / cam function»



2.5.1 Position registers

These are programmable registers which can have various functions assigned to them. Make changes only while the output stage is disabled, and then reset.

If a particular position value is exceeded, or not attained, this can be reported via the position registers. Their function is shown in the flow diagram.

Position register	Message via interface terminal
1	X11B.8
2	X11B.9
3	X11B.10
4	X11B.4

Inactive — No function allocated.

Pos.1 overshot (threshold) — Reports overshooting of pos. 1. The position is entered in µm.

Pos.1 not reached (threshold) — Reports failure to reach position 1. The position is entered in µm.

Within pos.1 and pos.2 (cam) — A signal is sent as soon as the drive is between position 1 and position 2. The positions are entered in µm.

Outside pos.1 and pos.2 (cam) — A signal is sent as soon as the drive is outside position 1 and position 2. The positions are entered in µm. This output is linked to the output terminal X11B/4. See the explanation in Chapter 2.6.1.2 PosReg 4 (Next-InPos).

Register state — Shows the state of the register (high or low).

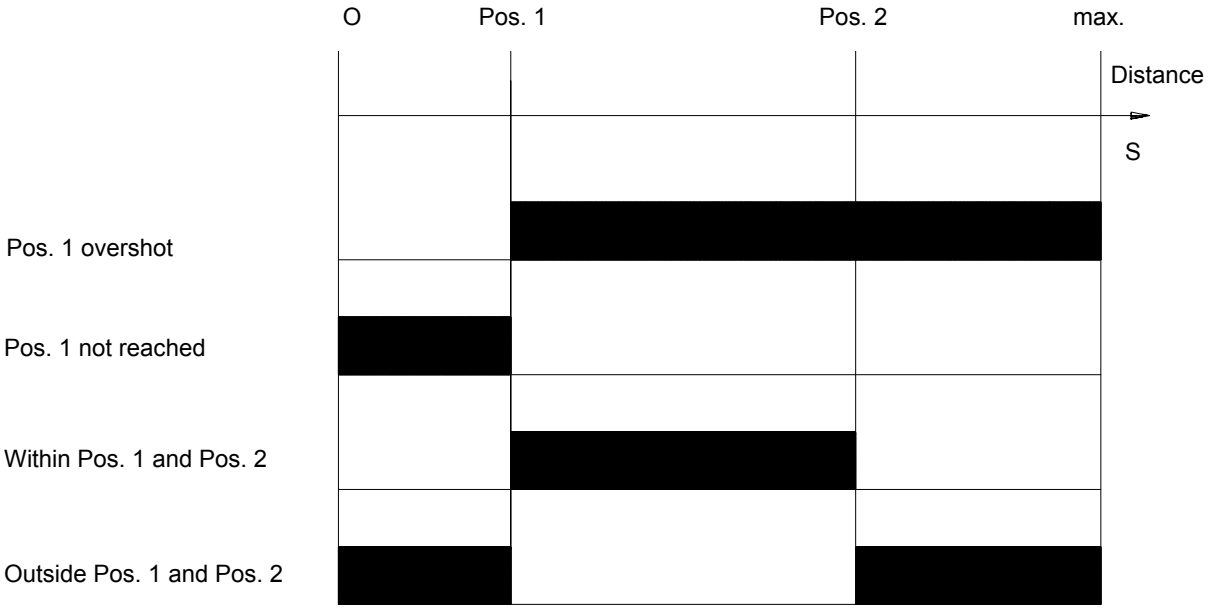
Actual position — Shows the actual position of the slide in µm.

Teach-in (F7)

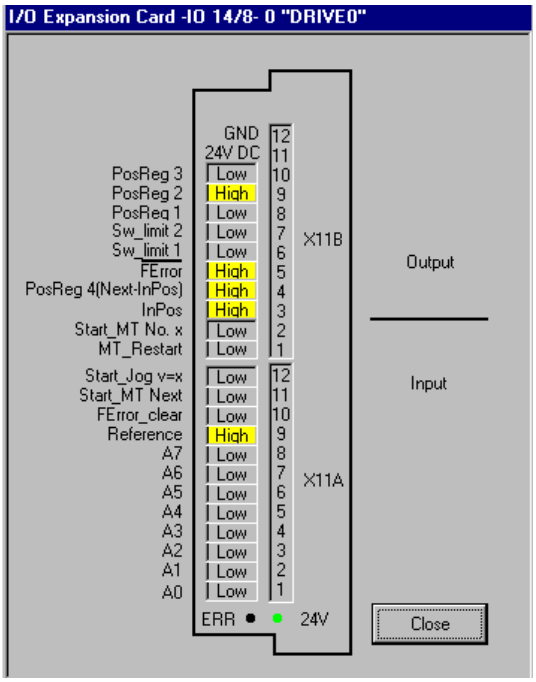
Taking over position 1 or position 2 of the respective position register.

Procedure:

- Reference point has been set
- Position field has been marked (mouse pointer or tabulator function)
- Activate teach-in key (mouse or function key F7)
- Take over position value (key: Take over)



2.6 Screen page “I/O digital X11“



Addressing time (min.) 4 ms
Start delay max. 2 ms

The states of the digital inputs/outputs are shown in the diagram of the connector X11A/B.

2.6.1 Digital inputs and outputs, expansion card X11A/B

The functions have been defined.

High functions: The function message is issued by a High signal at the respective interface terminal.

Low functions: The function message is issued by a Low signal at the respective interface terminal.

Connector X11A

Terminal	Function	Designation	Control edge
1	On	A0	Rising
2	On	A1	Rising
3	On	A2	Rising
4	On	A3	Rising
5	On	A4	Rising
6	On	A5	Rising
7	On	A6	Rising
8	On	A7	Rising
9	On	Reference	Rising
10	On	FError_clear	Rising
11	On	Start_MT Next	Settable (chapter 2.4.3)
12	On	Start_Jog v=x	Rising

Connector X11B

Terminal	Function	Designation	Control edge/logic
1	On	MT_ReStart	Rising
2	On	Start_MT No.x	Rising
3	Off	InPos	High-active
4	Off	PosReg4 (Next-InPos)	High-active
5	Aus	$\overline{\text{FError}}$	Low-aktiv
6	Off	Limit switch 1	High-active
7	Off	Limit switch 2	High-active
8	Off	PosReg1	High-active
9	Off	PosReg2	High-active
10	Off	PosReg3	High-aktiv
11	Various.	24V DC	
12	Various	I/O-GND	

2.6.1.1 Description of digital inputs X11A / X11B

1 ... 8, A0 ... A7 Motion block numbers 2^0 to 2^7, LSB, MSB.

9, Reference Polls the reference switch (zero pulse initiator).

10, FError_clear A rising edge at the digital input clears any warning that may be present (following error/response monitoring).

11, Start_MT Next The next motion task specified in the motion block (screen page “Next motion task” chapter 2.4.3) with the setting “Start via I/O”, is started. The target position of the present motion block must have been reached before the next motion task can be started.

12, Start_Jog v=x Start jog mode. The speed of movement is specified on the screen page "Motion tasks“ chapter 2.4.5. A rising edge starts the motion task; a falling edge cancels the motion task. Use two inputs to move in both directions (see digital I/O X3)

1, MT_Restart Continues the last cancelled motion task.

2, Start_MT No.x Start of a motion task stored in the servo amplifier indicating the motion task number which is present in bit-coded form at inputs A0 to A7. Motion task number "0" starts the reference traverse (homing). A rising edge starts the motion task; a falling edge cancels the motion task.

2.6.1.2 Description of digital outputs X11B

3, InPos When the target position (InPosition window) for a motion task has been reached, this is signalled by the output of a High signal. For all valid motion tasks, the size of the InPosition window is entered on the screen page “Motion tasks” chapter 2.16. If a number of motion tasks are automatically executed in sequence, the message is issued that the final position of the motion task (target position of the last motion task) has been reached. When the target position for a motion task sequence has been reached, this can be signalled by function “4, Next_InPos”.

4, PosReg 4 (Next-InPos) This function is linked to the setting of position register 4 (see page 2-22, Chapter 2.5.1 Position register). If "Outside pos. 1 and pos. 2" is active, then the function Next-InPos on X11B/4 is inactive. If "Outside pos. 1 and pos. 2" is inactive, the function PosReg 4 on X11B/4 is active.
PosReg 4. The set function of position register 4 (the function is defined on the screen page "Limits", Chapter 2.5) is indicated by a high signal.
Next-InPos. When the target position (InPosition window) for each motion task in an automatic sequence of motion tasks has been reached, this is signalled by the output of a High signal. For all valid motion tasks, the size of the InPosition window is entered on the screen page “Motion tasks” chapter 2.16. At the start of each individual motion task within a sequence of motion tasks, the input issues a Low signal.

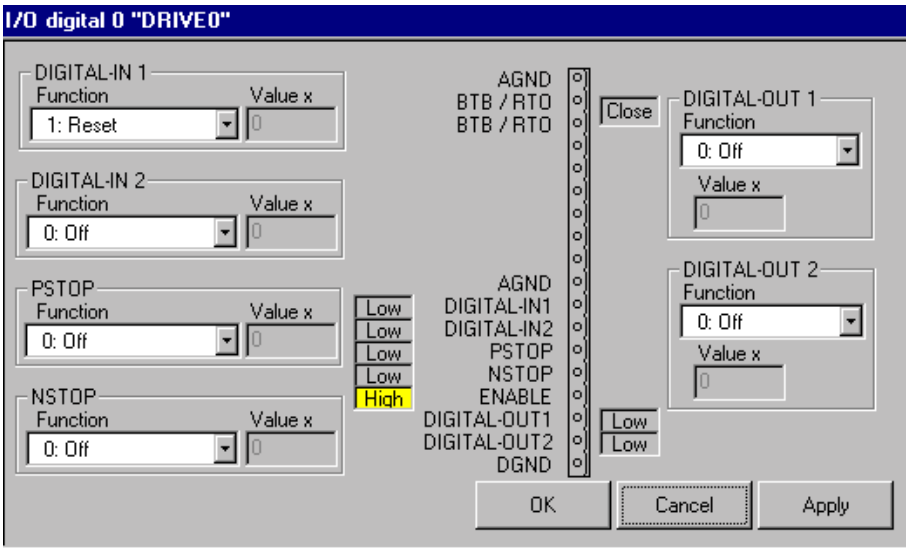
5, $\overline{\text{FError}}$ If the position moves outside the preset contouring-error window (screen page “Limit values” chapter 2.15), this is signalled by a Low signal.

6, SW_limit 1 When the software limit switch on the drive side has been reached, this is signalled (screen page “Limit values“ chapter 2.15).

7, SW_limit 2 When the software limit switch on the deflection side has been reached, this is signalled (screen page “Limit values“ chapter 2.15).

8...10, PosREG 1...3 The preset function of the respective position register (the function is specified on the screen page “Limit values” chapter 2.5) is indicated by a High signal.

2.7 Screen page «digital I/O X3»



Cycle time of the digital I/O functions approx. 1 ms.
The states of the digital inputs/outputs are shown in the diagram of the connector X3.

2.7.1 Digital inputs DIGITAL-IN1 / DIGITAL-IN2 / PSTOP / NSTOP

The terminals DIGITAL-IN1/2, PSTOP and NSTOP (X3/11,12,13,14) can be used in combination with internal functions. Changes can only be made if the output stage is disabled, followed by a reset.

ID	Function	Active edge	Auxiliary value	Function can be combined with			
				DIGITAL IN1 X3/11	DIGITAL IN2 X3/12	PSTOP X3/13	NSTOP X3/14
0	Off		-	x	x	x	x
1	Reset	↗	-	x			
2	PSTOP	↘ (Low active)	-			x	
3	NSTOP	↘ (Low active)	-				x
4	PSTOP+Intg.off	↘ (Low active)	-			x	
5	NSTOP+Intg.off	↘ (Low active)	-				x
6	PSTOP+NSTO	↘ (Low active)	-			x	
7	P/Nstop+Intg.of	↘ (Low active)	-			x	
12	Reference	↗	-	x	x	x	x
13	ROD/SSI	High/Low	-	x	x	x	x
15	Start_MT Next	Can be set	-	x	x	x	x
18	Ipeak2x	↗	% of Ipeak	x	x	x	x
20	Start_JOG x	↗	v in µm/s	x	x	x	x
23	Start2_MT No.x	↗	-	x	x	x	x
24	OPMODE A/B	High/Low	see descrip.	x	x	x	x
25	Zero_latch	↗	-	x	x	x	x
27	Emerg.Stop	↗	-	x	x	x	x
32	Brake	↗	-	x	x	x	x

2.7.1.1 Description of the digital inputs X3

0, Off No function.

1, Reset Software reset of the servo amplifier in the event of a fault. All the functions and displays are set to the initial status. Parameters that are not stored in the EEPROM are deleted; the parameter set which is stored in the EEPROM is loaded. If any of the error messages F01, F02, F03, F05, F08, F13, F16 or F19 (chapter 2.8.1) are present, then no software reset will be carried out, instead just the error message will be deleted. This means that, for example, the encoder output signals are stable and can continue to be evaluated by the control system.

2, PSTOP Limit-switch function. A Low signal on the input terminal PSTOP (terminal X3/13) inhibits the positive direction of rotation. The motor brakes with the emergency stop ramp and comes to a standstill **with the I-component** under control; mechanical delimitation (stop) is **not** permitted. A falling edge initiates the braking process. Servo horizontal axes SHA do not require a hardware limit switch.

3, NSTOP Limit-switch function. A Low signal on the input terminal NSTOP (terminal X3/14) inhibits the negative direction of rotation. The motor brakes with the emergency stop ramp and comes to a standstill **with the I-component** under control; mechanical delimitation (stop) is **not** permitted. A falling edge initiates the braking process. Servo horizontal axes SHA do not require a hardware limit switch.

4, PSTOP+Intg.off Limit-switch function. A Low signal on the input terminal PSTOP (terminal X3/13) inhibits the positive direction of rotation. The motor brakes with the emergency stop ramp and comes to a standstill **without the I-component** under proportional control; mechanical delimitation (stop) is permitted. A falling edge initiates the braking process. Servo horizontal axes SHA do not require a hardware limit switch.

5, NSTOP+Intg.off Limit-switch function. A Low signal on the input terminal NSTOP (terminal X3/14) inhibits the negative direction of rotation. The motor brakes with the emergency stop ramp and comes to a standstill **without the I-component** under proportional control; mechanical delimitation (stop) is permitted. A falling edge initiates the braking process. Servo horizontal axes SHA do not require a hardware limit switch.

6, PSTOP+NSTOP Limit-switch function STOP, regardless of the direction of rotation. A Low signal on the input terminal PSTOP (terminal X3/13) inhibits both directions of rotation. The motor brakes with the emergency stop ramp and comes to a standstill **with the I-component** under control; mechanical delimitation (stop) is **not** permitted. A falling edge initiates the braking process. Servo horizontal axes SHA do not require a hardware limit switch.

7, P/Nstop+Intg.off Limit-switch function STOP, regardless of the direction of rotation. A Low signal on the input terminal PSTOP (terminal X3/13) inhibits both directions of rotation. The motor brakes with the emergency stop ramp and comes to a standstill **without the I-component** under proportional control; mechanical delimitation (stop) is permitted. A falling edge initiates the braking process. Servo horizontal axes SHA do not require a hardware limit switch.

12, Reference Polls the reference switch (zero point initiator)

15, Start_MT Next The following task which is specified in the motion block (screen page “Following task” chapter 2.4.3) with the setting “Start via I/O”, is started. The target position of the present motion block must have been reached before the following task can be started.

18, Ipeak2x Switch over to a second (lower) peak value of current. Scaled to x (0...100) % of the peak current of the instrument. After the function has been selected you can enter the percentage value in Auxiliary value “x”.

20, Start_JOG x A rising edge starts jog mode (setup mode/endless motion). The speed is specified in Auxiliary value x. Since the jog mode is processed via the internal position controller, OPMODE=8 is the prerequisite for this mode. The speed is specified in µm/s.

23, Start2_MT No.x Start of a motion task that is stored in the servo amplifier, with definition of the motion task number which is present in bit-coded form on inputs A0 to A7. Motion task number “0” starts the reference traverse (homing). A rising edge starts the motion task.

Warning !
The motion task does not stop automatically if the start signal is removed!

The motion task needs to be stopped in one of the following ways:
- via a falling edge on a digital input with the function «Start_MT No.x»
- via the ASCII command STOP
- via the STOP function of the setup software.

24, OPMODE A/B

Switches the operation mode from Electrical gearing (OPMODE) to Positioning (OPMODE 8) with slave horizontal axes (without holding brakes). This function is used for initialising (zeroing) the slave axis in the case of mechanically non-connected master-slave applications. Since in their disabled state, horizontal axes are without torque, a reference traverse (homing) must be carried out after each disable.

Auxiliary value Operation mode see chapter 2.16.3

State of DIGITAL-INx		Auxiliary value	
High	Low	Hex	Input (dec)
Operation mode 8, position of motion blocks	Operation mode 4, position of electrical gearing	804	2052
Operation mode 4, position of electrical gearing	Operation mode 8, position of motion blocks	408	1032

Warning !
Use only in the case of mechanically non-connected slave axes!

25, Zero_latch Setting the ROD zero pulse offset. With the rising edge on the digital input, the current position is converted, depending on the set ROD resolution, and entered in the variable NI-Offset (chapter 2.18.1). Then the new setting must be saved in the serial EEPROM (chapter 2.3). This function makes it possible for the ROD zero pulse to be issued always at the current position (within a revolution).

27, Emerg.Stop The low level initiates an emergency stop phase (cancels a motion and stops the drive via the emergency stop ramp). Irrespective of the operation mode (OPMODE) set, the speed controller is activated during the emergency-stop phase.

32, Brake A high level at the digital input releases the brake (SVA-130 only). The function of this input is only active with the output stage disabled and with the BTB closed (no amplifier error).

Warning !
The load of the vertical axis must be held by an appropriate device!

2.7.2 Digital outputs DIGITAL-OUT1 / DIGITAL-OUT2

The following standard pre-programmed functions can be combined with the digital outputs DIGITAL-OUT1 (terminal X3/16) or DIGITAL-OUT2 (terminal X3/17).

High functions: The presence of the function that is set is indicated by a High signal on the respective interface terminal.

Low functions: The presence of the function that is set is indicated by a Low signal on the respective interface terminal.

ID	Function	Logic	Auxiliary value x
0	Off	-	-
1	v < x	High	Velocity in µm/s
2	v > x	High	Velocity in µm/s
5	SW_limit	High	-
6	Pos. > x	High	Position in µm
8	I_act < x	High	Current in mA
9	I_act > x	High	Current in mA
11	I²t	High	-
16	Next-InPos	High	-
17	Error/Warn	High	-
18	Error	High	-
19	DC_Link > x	High	Voltage in V
20	DC_Link < x	High	Voltage in V
21	ENABLE	High	-
22	Zero_pulse	High	-
24	Ref.OK	High	-

2.7.2.1 Description of the digital output functions X3

0, Off No function assigned.

1, v < x As long as the value for the velocity is less than a preset value (auxiliary value “x”), a High signal will be output. After the function has been selected, the speed v in mm/s can be entered in auxiliary value “x”.

2, v > x As long as the value for the velocity is less than a preset value (auxiliary value “x”), a High signal will be output. After the function has been selected, the speed v in mm/s can be entered in auxiliary value “x”.

5, SW_limit When a software limit switch (SW limit switch 1 or SW limit switch 2) has been reached, this is indicated by a High signal.

6, Pos. > x If the position of the slide exceeds a preset value (auxiliary value “x”), a High signal will be output. After the function has been selected, the signalling position in mm can be entered in auxiliary value “x”.

8, I_act < x The output is a High signal, as long as the absolute r.m.s. value of the actual current is lower than a specified value in mA (auxiliary value “x”). After the function has been selected you can enter the value of the current in auxiliary value “x”.

9, I_act > x The output is a High signal, as long as the absolute r.m.s. value of the actual current is higher than a specified value in mA (auxiliary value “x”). After the function has been selected you can enter the value of the current in auxiliary value “x”.

11, I²t If the preset I²t monitoring threshold is reached (screen page “Limit values” ➔ chapter 2.15) this is indicated by a High signal.

16, Next InPos Use this function only if position register no. 4 (I/O version) is used.
For a description of signal behaviour refer to chapter 2.16.2 "Settings".

17, Error/Warn The output produces a High signal if an error or a warning message is signalled by the servo amplifier. For a list of warning messages and error messages refer to chapter 2.8.1 and 2.8.2.

18, Error The output produces a High signal if an error is signalled by the servo amplifier. For a list of error messages refer to chapter 2.8.1.

19, DC_link > x A High signal is output if the actual value of the DC-link voltage is higher than a specified value in volts (auxiliary value “x”). After the function has been selected, you can enter the voltage value in auxiliary “x”.

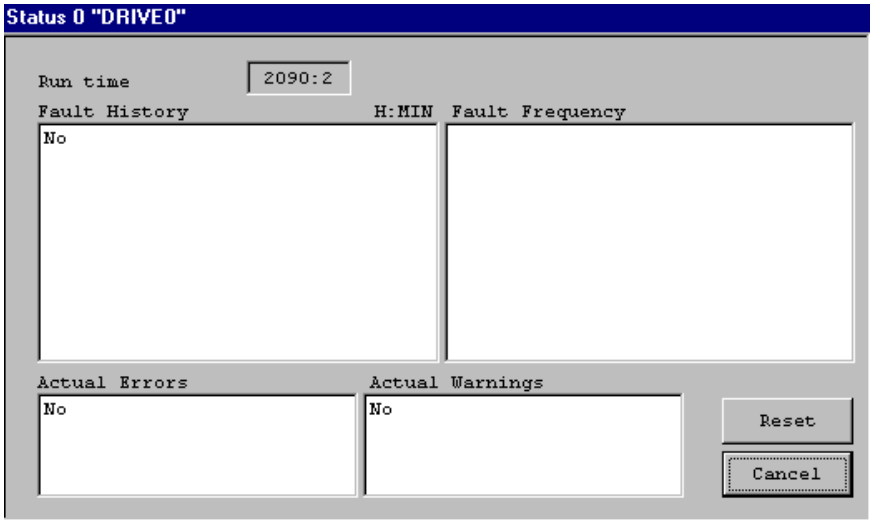
20, DC_link < x A High signal is output if the actual value of the DC-link voltage is lower than a specified value in volts (auxiliary value “x”). After the function has been selected, you can enter the voltage value in auxiliary “x”.

21, ENABLE A High signal is output if the servo amplifier is enabled. To obtain enable, the external enable signal on terminal X3/15 must be present, the Enable status must be set in the setup software, and no error must be present that would cause automatic internal disabling of the servo amplifier (see chapter 2.8.1) for error messages).

22, Zero_pulse The zero pulse (High signal) of the encoder emulation is indicated. This function is only useful at very low speeds.

24, Ref_OK The output signals High if a reference point is available. (A reference traverse (homing) has been carried out or a reference point has been set.)

2.8 Screen page «Status»



Run time Time in hours during which the servo amplifier has been operating with the output stage enabled.

Last 10 errors Displays the last 10 errors that have occurred, together with the time of their occurrence with reference to the run time.

Frequency Displays the frequency of occurrence of all faults that caused the servo amplifier to switch off.

Actual errors Displays the errors currently reported by the servo amplifier according to error messages F01 to F32 in the LED display on the front panel of the amplifier. See chapter 2.8.1 for a list of error messages.

Actual warnings Displays the errors currently reported by the servo amplifier according to warnings n01 to n32 in the LED display on the front panel of the amplifier. See chapter 2.8.2 for a list of warning messages.

Reset Software reset (warm start) of the servo amplifier. The servo amplifier must be disabled. Present errors are deleted, the servo amplifier software is re-initialised, and communication is established anew.

2.8.1 Error messages

Errors that occur are displayed via a coded error number in the LED display on the front panel and on the screen page “STATUS”. All error messages result in the following action: the BTB contact (terminals X3/2 and X3/3) opens; the drive switches off in a managed way (braking with emergency ramp); and the output stage of the amplifier switches off (motor loses all torque). The holding brake of the motor is activated (SVA-130 only).

Number	Designation	Explanation
F01*	Heat sink temperature	Heat sink temperature is too high Limit has been set to 80°C by the manufacturer
F02*	Overvoltage	Overvoltage in the DC-link circuit Limit depends on the mains supply voltage
F03*	Following error	Message from the position controller
F04	Feedback	Cable break, short-circuit, short to ground
F05*	Undervoltage	Undervoltage in the DC link Limit has been set to 100V by the manufacturer
F06	Motor temperature	Temperature sensor faulty or motor temperature too high Limit has been set to 145°C by the manufacturer
F07	Auxiliary voltage	Internal auxiliary voltage not OK
F08*	Overspeed	Motor running away, speed is higher than is permissible
F09	EEPROM	Checksum error
F10	Flash-EPROM	Checksum error
F11	Brake	Broken cable, short-circuit, short to ground (SVA only)
F12	Motor phase	Motor phase is missing (broken cable or similar)
F13*	Internal temperature	Internal temperature in the amplifier is too high
F14	Output stage	Fault in the power output stage
F15	I²t max.	I²t max. value exceeded
F16*	Mains BTB	2 or 3 supply phases are missing
F17	A/D converter	Error in the analog-digital conversion
F18	Regen	Regen circuit faulty or setting incorrect
F19*	Mains phase	A supply phase is missing
F20	Slot error	Hardware error on the expansion card
F21	Handling error	Software error on the expansion card
F22	Earth fault	Inactive
F23	CAN bus inactive	Communication interrupted by CAN bus
F24-F31	Reserved	Reserved
F32	System fault	System software not responding correctly

* = These error messages can be cleared without resetting the amplifier. If only one of these errors is present and the RESET button or the I/O function RESET is used, then too, only the error is cleared.

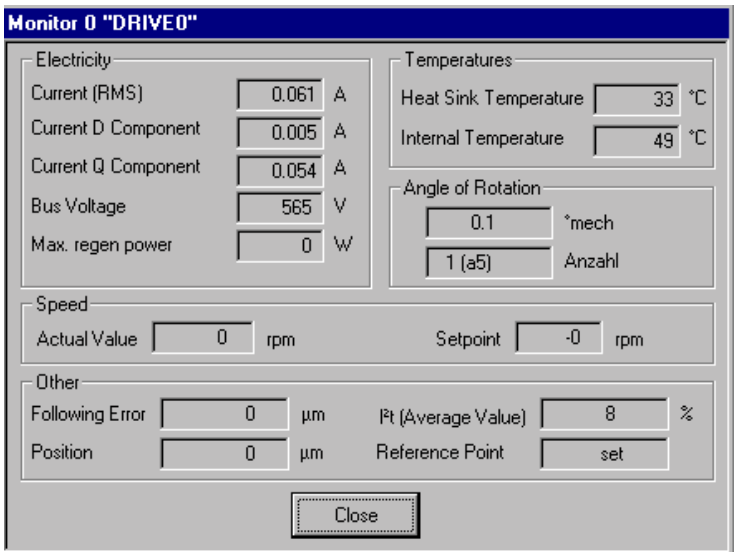
2.8.2 Warnings

Faults that occur but do not cause a switch-off of the amplifier output stage (BTB contact remains closed) are displayed as a numerical warning code in the LED display on the front panel and on the screen page “STATUS”. Warnings that are recognised by the supply monitoring system will only be reported after the servo amplifier has been enabled.

Number	Designation	Explanation
n01	I²t	I²t message threshold exceeded
n02	Regen power	Preset regen power reached
n03*	FError	Preset following error window exceeded
n04*	Response monitoring	Response monitoring (field bus) active
n05	Mains phase	Mains phase missing
n06*	SW limit switch 1	Software limit switch 1 exceeded
n07*	SW limit switch 2	Software-limit switch 2 exceeded
n08	Motion task_error	A faulty motion task was started
n09	No reference point	No reference point set at start of task
n10*	PSTOP	Hardware limit switch PSTOP activated (servo axes without hardware limit switch)
n11*	NSTOP	Hardware limit switch NSTOP activated (servo axes without hardware limit switch)
n12	Default values	Inactive
n13	Expansion card	Expansion card not functioning correctly
n14	HIPERFACE®	Inactive
n15	Table error	Inactive
n16-n31	Reserved	Reserved
n32	Firmware beta version	Firmware version has not been released
A	Reset	RESET is present at DIGITAL IN1

* = These warning messages lead to a controlled shut-down of the drive (braking with the emergency ramp)

2.9 Screen page «Actual values»



Electrical system

Effective current Shows the value in amperes of the actual current indication (Arms value, always positive).

Current D comp. Shows the value in amperes of the current D-component (Id, reactive current) of the current indication.

Current Q comp. Shows the value in amperes of the current Q-component (Iq, active current) of the current indication. The sign that is displayed is negative in regenerative operation (motor under braking).

Bus voltage Shows the DC-link (DC-bus) voltage in V, produced by the amplifier.

Regen power Shows the actual regenerative power, in W.

Temperatures

Heat sink temperature Shows the temperature in degrees Celsius, of the heat sink in the servo amplifier.

Internal temperature Shows the temperature in degrees Celsius, inside the servo amplifier.

Angle of rotation

Angle of rotation Shows the actual angle of rotation of the rotor (only for speeds n < 20 min^{-1}) in degrees and number in relation to the mechanical zero point of the measuring system.

Speed

Actual speed Shows the actual rotational speed of the motor in [min^{-1}]

Setpoint speed Shows the currently set speed in [min^{-1}]

Other

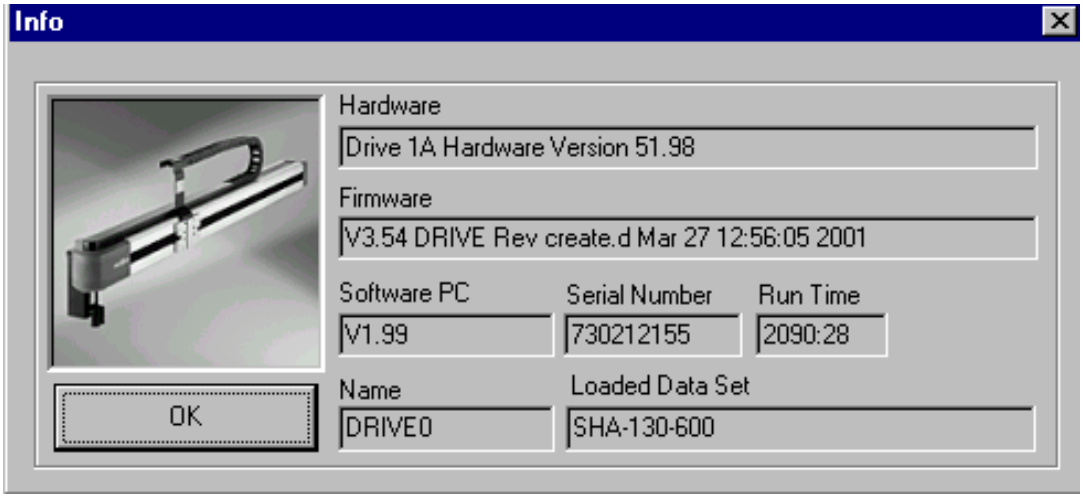
Following error Shows the present following (contour) error in [mm].

Position Shows the present position [mm]

I²t Shows the actual effective load in per cent of the preset effective current I_{rm}.

Reference point Shows whether or not a reference point has been set.

2.10 Screen page «Info»



Hardware Version level of the servo amplifier hardware

Firmware Version level of the servo amplifier firmware

Software PC Version level of the current operator software

Serial number Serial number of the servo amplifier

Run time The number of operating hours of the enabled servo amplifier (i.e. output stage active). Saved at 6 min. intervals. If the 24V supply is switched off, a maximum of 6 min. operating time may be lost.

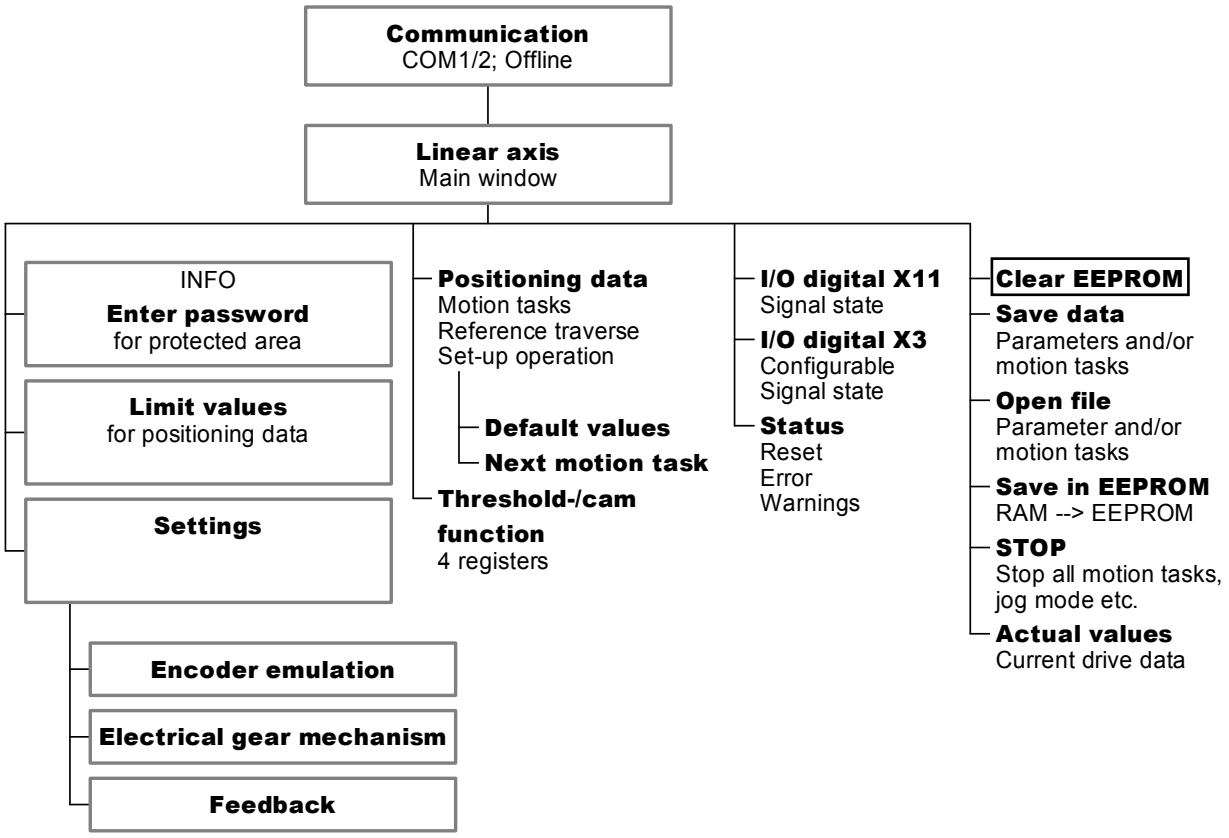
Name Name of the servo amplifier.

Data set Shows the data-set loaded and the type designation of the Montech linear axis.

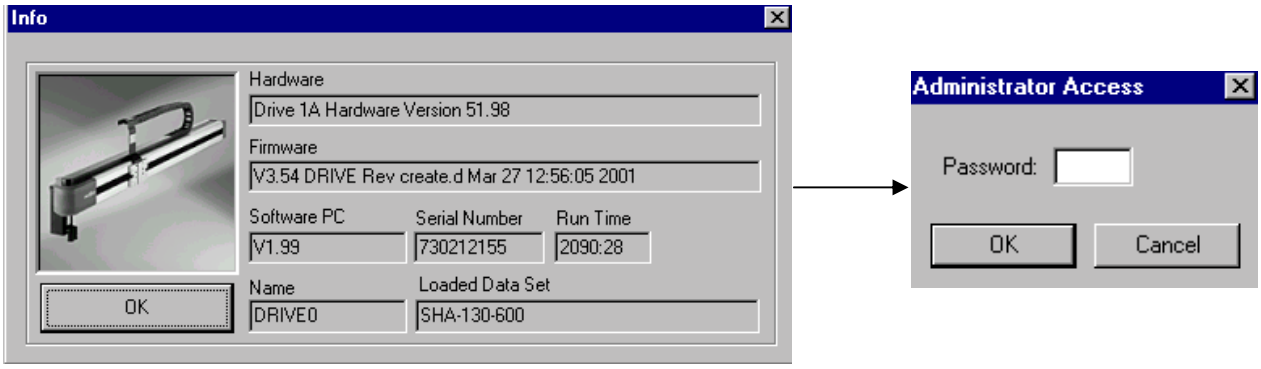
2.11 Software structure (password-protected area)

In the password-protected area of the software the equipment manufacturer can define equipment-specific limit values. The operator of the equipment is thus unable either not to reach, or to exceed, the limit values.
The following additional changes can be made:

- Erasure of the EEPROM.
- Loading default data or special solutions from hard disk/diskette.
- Limit values: maximum traversing rate, acceleration, emergency stop ramp, following errror and I2tmessage.
- Software limit switch positions.
- Operation mode (master-slave or position mode), encoder emulation, electrical gearing, feedback system, in-position behaviour.



2.12 Enter password



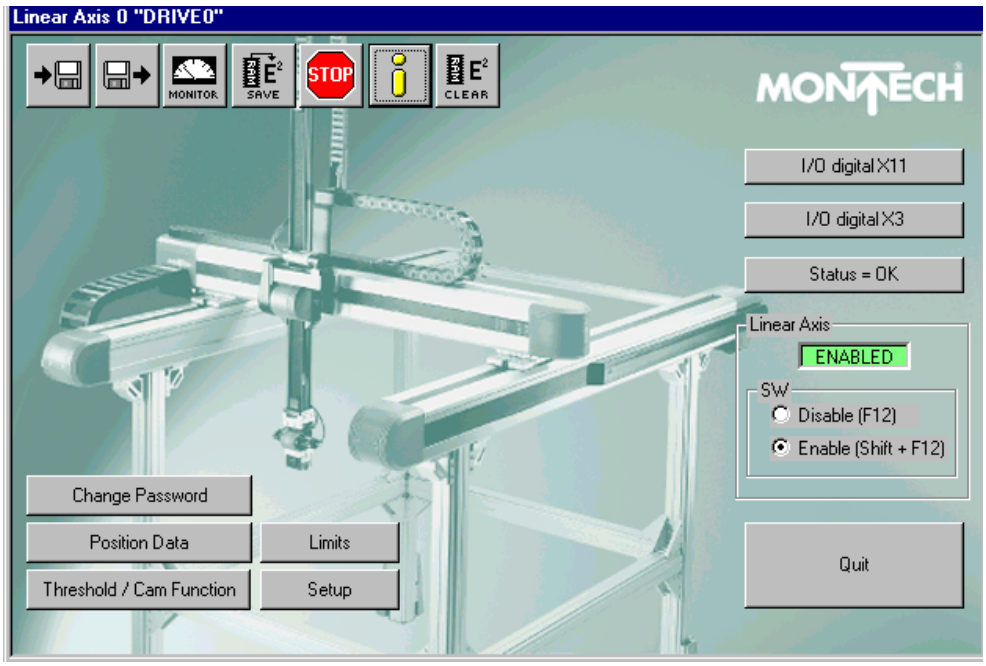
Procedure:

- Open device info window
- Activate key combination Ctrl+Alt+Shift
- Click the mouse on the motor image
- → Administrator access window opens
- Enter password (default: no password)

The following additional buttons appear on the Linear axis page:

- Erase EEPROM
- Change password
- Limit values
- Settings

2.13 Screen page «Linear axis» (password-protected area)



By left-clicking the mouse on the respective buttons you can call up the associated screen pages or functions.

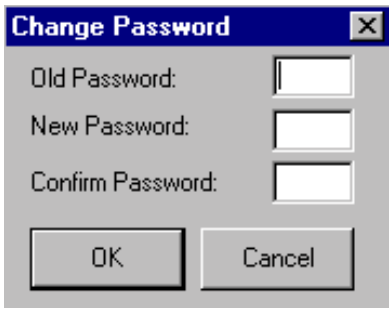
The EEPROM of the servo amplifier is cleared and a safe data set is loaded. To operate the linear axis, a default data set (window Settings) first needs to be loaded.

Change password: Open the screen page “Change password” (➔ chapter 2.14)

Limit values: Open the screen page “Limit values” (➔ chapter 2.15)

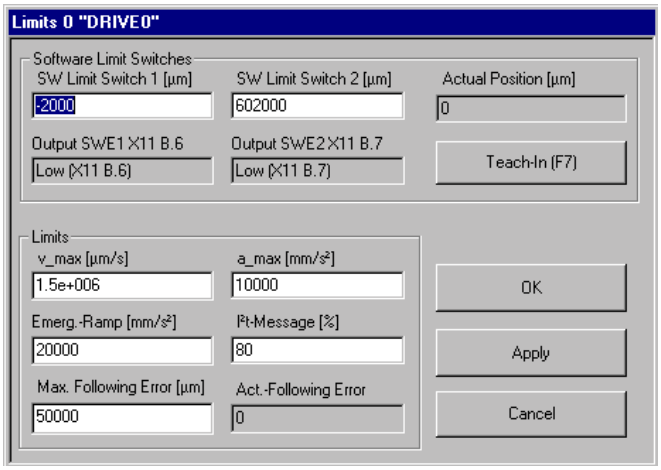
Settings: Open the screen page “Settings” (➔ chapter 2.16

2.14 Screen page «Change password»



Change the password for the protected area.

2.15 Screen page «Limit values»



2.15.1 Software limit switches 1 and 2

The software limit switches form part of the monitoring functions of the position controller.

- **SW limit switch 1:** Monitoring takes place whether the actual position value is lower than the preset value (the negative direction of rotation is now inhibited. Move out of limit switch 1 in positive direction). The state of limit switch 1 can be queried via interface terminal X11B/6. Enter the distance between the limit-switch position and the reference point in µm.

  Default values:

SHA-470:	- 5‘000 µm	SHA-340:	- 2‘000 µm
SHX-470:	- 5‘000 µm	SHX-340:	- 2‘000 µm
SHY-470:	- 5‘000 µm	SHY-340:	- 2‘000 µm
SVA-130:	- 2‘000 µm	SHE/SVE-130:	- 1‘000 µm

- **SW limit switch 2:** Monitoring takes place whether the actual position value is higher than the preset value (the positive direction of rotation is now inhibited. Move out of limit switch 2 in negative direction). The state of limit switch 2 can be queried via interface terminal X11B/7. Enter the distance between the limit-switch position and the reference point in µm.

  Default values:

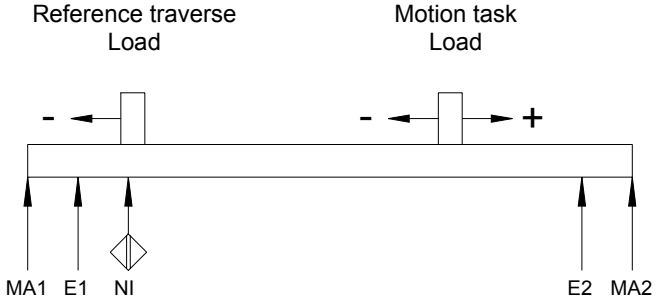
SHA-470:	stroke + 5‘000 µm
SHX-470:	stroke + 5‘000 µm
SHY-470:	stroke + 5‘000 µm
SHA-340:	stroke + 2‘000 µm
SHX-340:	stroke + 2‘000 µm
SHY-340:	stroke + 2‘000 µm
SVA-130:	stroke + 2‘000 µm
SHE/SVE-130:	stroke + 1‘000 µm

The drive brakes with the emergency ramp and remains at standstill under torque.

Position of the software limit-switches SHA, FP (SVA):

Legend

MA1 :	Machine stop, left (top)
NI :	Zero-pulse initiator (homing)
E1 :	Software limit-switch 1
E2 :	Software limit-switch 2
MA2 :	Machine stop, right (bottom)
+ :	Positive count direction
- :	Negative count direction



2.15.2 Limit values

v_max [µm/s] Maximum permissible traversing rate for position data (factory default):

SHA-470:	2‘300‘000	µm/s	SHA-340:	2‘000‘000	µm/s
SHX-470:	1‘500‘000	µm/s	SHX-340:	1‘500‘000	µm/s
SHY-470:	1‘500‘000	µm/s	SHY-340:	2‘000‘000	µm/s
SVA-130:	1'300'000	µm/s	SHE-130:	1'000'000	µm/s
			SVE-130:	1‘000‘000	µm/s

a_max [mm/s^2] Maximum permissible acceleration for position data (factory default):

SHA-470:	10‘000	mm/s^2	SHA-340:	10‘000	mm/s^2
SHX-470:	3‘750	mm/s^2	SHX-340:	4‘000	mm/s^2
SHY-470:	5‘000	mm/s^2	SHY-340:	10‘000	mm/s^2
SVA-130:	5'000	mm/s^2	SHE-130:	6'500	mm/s^2
			SVE-130:	7‘500	mm/s^2

Emergency brake ramp Braking ramp for emergency braking. This braking ramp is used if the message n03, following error, or 04 response monitoring occurs, as well as when a hardware or software limit switch is activated or if the drive has been disabled.

The maximum emergency brake ramp has been set as follows (factory default):

SHA-470:	20‘000	mm/s2	SHA-340:	20‘000	mm/s2
SHX-470:	10‘000	mm/s2	SHX-340:	8‘000	mm/s2
SHY-470:	10‘000	mm/s2	SHY-340:	20‘000	mm/s2
SVA-130:	10'000	mm/s2	SHE-130:	10'000	mm/s2
			SVE-130:	10‘000	mm/s2

I²t message Sets the level, as a percentage value of the r.m.s. current above which a message will be sent to one of the programmable outputs DIGITAL-OUT1/2 (X3/16 or X3/17). The default is 85%.

Effects: Value too low — message appears too soon, drive is not fully utilised.
Value too high — limiting occurs at the same time as the message.

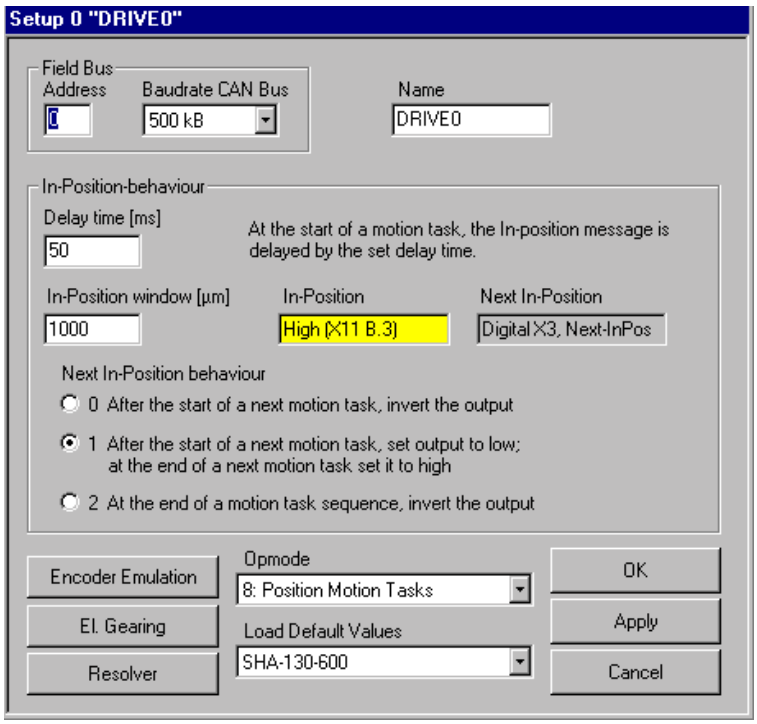
Following error Following error refers to the maximum difference (+/- window) between the position setpoint and the actual position that is permitted during processing. If the value moves outside this window, then the position controller generates an error message and brakes the drive, using the emergency stop ramp. The following values have been set (factory default):

SHA-470:	60‘000	µm	SHA-340:	50‘000	µm
SHX-470:	60‘000	µm	SHX-340:	60‘000	µm
SHY-470:	60‘000	µm	SHY-340:	50‘000	µm
SVA-130:	30'000	µm	SHE-130:	20'000	µm
			SVE-130:	20‘000	µm

Effects: Value too low — the acceleration process will be interrupted.
Value too high — a following error will not be recognised.

Following error actual The actual following error is displayed in µm.

2.16 Screen page «Settings»



Encoder emulation: Opens the screen page «Encoder emulation» (➔ chapter 2.18)

Electrical gearing: Opens the screen page «Electrical gearing» (➔ chapter 2.17)

Feedback: Opens the screen page «Feedback» (➔ chapter 2.19)

2.16.1 Field bus

Address Enter the station address (1...63) of the amplifier. This number is required by the field bus (CANopen, PROFIBUS DP, SERCOS etc.) and for the parameter setting of the servo amplifier in multi-axis systems, for unambiguous identification of the servo amplifier within the system. The address is displayed in the setup software in the title bar of every screen page, as long as you are working online.

Baud rate CAN bus Enter the baud rate (10, 20, 50, 100, 125, 250, 333, 500, 666, 800, 1000 kBaud) of the amplifier. This transmission rate is required by the field bus (CANopen) as well as for the parameter setting of servo amplifiers in multi-axis systems.

Name Here you can assign a name (8 characters max.) to the servo amplifier. This makes it easier for you to allocate a function within the system to the servo amplifier. The name is displayed in the setup software in the title bar of every screen page. In offline mode the name provides an indication as to the origin of the currently active data set.

2.16.2 InPosition behaviour

Delay time Delay time for the InPosition message in ms. When a motion task is started, the InPosition message is withdrawn and monitoring of the InPosition window is only activated after the set time has elapsed. This function is particularly important with position activities within the InPosition window. In any case it is ensured that the InPosition message is withdrawn for a specified time.

InPosition window Sets the InPosition window [µm]. Determines at what distance from the setpoint position the message “InPosition” is to be issued. The drive moves exactly to the target position.

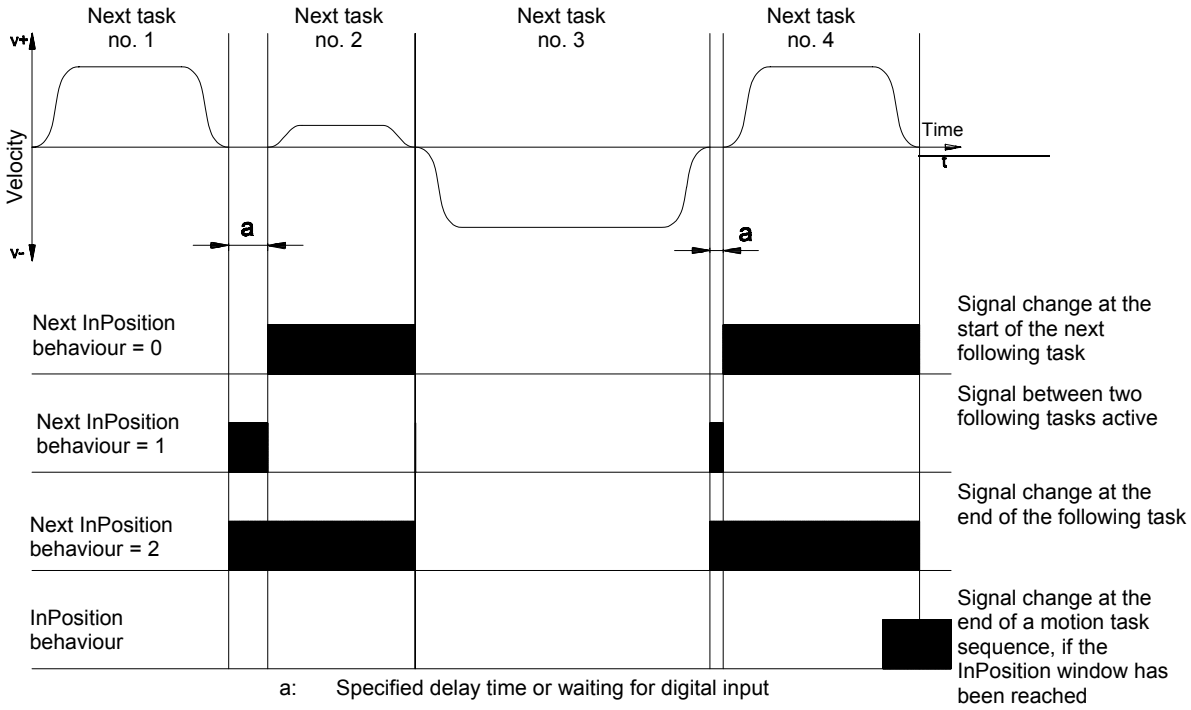
Effects: Value too low — time for positioning increases; no InPosition message
Value too high — InPosition is signalled to the PLC.

Next InPosition behaviour

With this setting the function of the interim message can be configured in a sequence of motion tasks. The function "Intermediate message in a motion task sequence" (Next InPos) is available if an I/O expansion card is used (terminal X11B.4) or if a digital output of the base card has been configured with the function Next-In Pos. (-> chapter 2.7.2). At the start of the first motion block of a sequence of motion blocks, the output “Next InPos” is always set to 0. The behaviour of the output when carrying out the sequence of motion blocks, depends on the setting:

0 – The output is inverted during the start of a following motion block.
1 – At the start of a motion block, the output is set to 0; on completion of a motion block the output becomes High.
2 – The output is inverted at the end of a motion block.

During a sequence of motion tasks in which the motion tasks are started immediately, only the settings 0 or 2 are useful. At a setting of 1 the High state is so brief that it may well not be registered by the external control system.
If a next motion block is to be started by means of an I/O (INxMODE=15), then setting 2 or 1 should be used. In this setting, the end of a motion block is signalled by the high state (1) or by the change of state (2) at the "Next InPos“ output. After this, via the input "Start next motion task" the external control system can initiate the next motion task to be continued.


Next task no. 1
Next task no. 2
Next task no. 3
Next task no. 4
v+
Velocity
v-
Time
t
a
a
Next InPosition behaviour = 0
Next InPosition behaviour = 1
Next InPosition behaviour = 2
InPosition behaviour
Signal change at the start of the next following task
Signal between two following tasks active
Signal change at the end of the following task
Signal change at the end of a motion task sequence, if the InPosition window has been reached

a: Specified delay time or waiting for digital input

2.16.3 Operation mode

OPMODE Use OPMODE to set the operation mode (basic function) of the amplifier. This mode can be switched at any time via field bus interface or digital I/O (OPMODE A/B; -> chapter 2.7.1.1).

The following settings are possible:

Code	Function	Comment
4	Position of electrical gearing	Position controller “pulse follower”. Operation mode of slave axes (master-slave operation).
6	SERCOS position control	Position control with SERCOS expansion card. Is used only in conjunction with the SERCOS option.
8	Position of motion blocks	Position control via stored motion blocks. Standard operation mode.

Warning !
OPMODE can be switched with the drive in motion. This can lead to dangerous acceleration. Switch OPMODE while the drive is in motion only if the drive application allows this!

2.16.4 Loading default values

The data sets of the axis to be used can be loaded from the SERVOLINE database. If an encoder is used as a feedback unit, the motor number will automatically be reported to the servo amplifier. Changes can be made only while the amplifier is disabled.

The following data records can be selected:

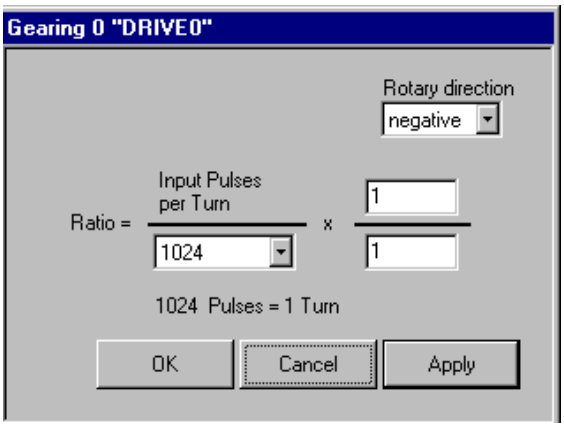
- SHA-340-400
- SHA-340-600
- SHA-340-800
- SHA-340-1000
- SHA-340-1200
- SHA-470-800
- SHA-470-1200
- SHA-470-1600
- SHA-470-2000
- SHA-470-2400
- SHX-340-400
- SHX-340-600
- SHX-340-800
- SHX-340-1000
- SHX-340-1200
- SHX-470-800
- SHX-470-1200
- SHX-470-1600
- SHX-470-2000
- SHX-470-2400
- SHY-340-400
- SHY-340-600
- SHY-340-800
- SHY-340-1000
- SHY-340-1200
- SHY-470-600
- SHY-470-1000
- SHY-470-1400
- SHY-470-1800
- SHY-470-2200
- SVA-130-200
- SVA-130-400
- SVA-130-600
- SHE-130-100
- SHE-130-200
- SHE-130-300
- SVE-130-100
- SVE-130-200
- MONTRAC lift (motor top)
- MONTRAC lift (motor bottom)
- Special data record

- If a type of linear axis other than the one already present in the EEPROM is loaded, **all motion task data will be cleared!**
- All parameters will be overwritten by the default parameter record of the SERVOLINE database.

Special data record

Use this option to load special solutions from a hard disk/diskette.

2.17 Screen page «Electrical gearing»



The servo amplifier obtains a position setpoint value from another device (master servo amplifier) and controls the position of the motor shaft synchronous to this master (guidance) signal.
Cycle time of the electrical gearing is 250 µs; a value averaged over 1000 µs is used.

Direction of rotation

Determines the direction of rotation of the motor shaft in relation to the polarity of the setpoint value. The setting is used to change the direction of the slave axis during master-slave operation. Make changes only while the amplifier is disabled, and then reset.

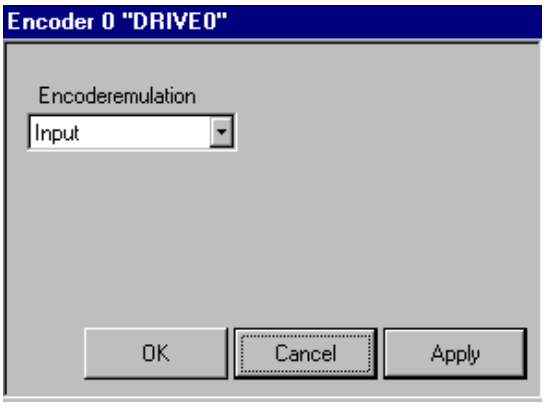
ID	Function
0	Negative
1	Positive

$$Gearing - ratio = \frac{Input - pulses / motor - revolution}{x} \cdot \frac{y}{z} \leq 1$$

x Input pulses in increments/motor revolution. x must correspond to the setting of the master axis (encoder emulation ROD).

y/z Gearing down of the axis. **Must be ≤ 1!**

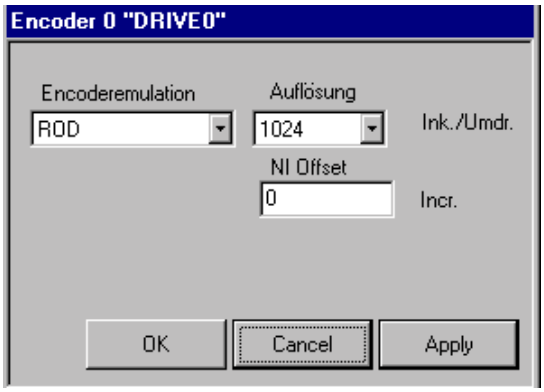
2.18 Screen page «Encoder emulation»



Cycle time of encoder emulation 0.5 µs.

ID	Function	Comments
0	Input	The interface is used as an input. Setting the slave axis (master-slave operation).
1	ROD	Incremental-encoder emulation. In the servo amplifier, the position of the motor shaft is calculated from the cyclically absolute signals from the resolver or encoder. This information is used to create incremental-encoder compatible pulses (max. 250 kHz). Pulses are emitted at the connector X5 as two signals A and B with a 90° electrical phase difference, and a zero pulse.
2	SSI	SSI-encoder emulation. In the servo amplifier, the position of the motor shaft is calculated from the cyclically absolute signals from the resolver or encoder. This information is used to create a position output in a format that is compatible with the standard SSI-absolute-encoder format. 24 bits are transmitted, with the upper 12 bits being fixed to ZERO, and the lower 12 bits containing the position information. For 2-pole resolvers, the position value refers to one revolution of the motor.

2.18.1 ROD



Resolution ROD

Determines the number of increments per motor revolution that are output. Change this setting only while the amplifier is disabled.

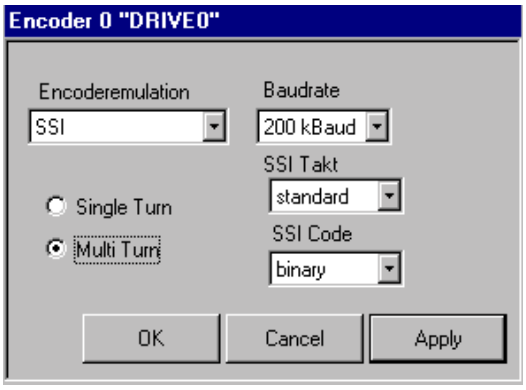
Resolution	Increments per motor revolution for feedback = Resolver	EnDAT	
256	256	256	
512	512	512	
1024	1024	1024	
2048	-	2048	
4096	-	4096	
8192	-	8192	SHA-130: up to v = 1.1 m/s
			SVA-130: up to v = 0.9 m/s
16384	-	16384	SHA-130: up to v = 0.5 m/s
			SVA-130: up to v = 0.4 m/s
			SHA-470: up to v = 1.1 m/s
			FP-130: x-axis up to v = 1.1 m/s y-axis up to v = 0.5 m/s

The resolution in the control system can be increased by quadruple evaluation of the increments.

NI-Offset

Determines the position of the zero (marker) pulse when A=B=1. The entry relates to the zero-crossing of the feedback unit.

2.18.2 SSI



Determines whether single-turn or multi-turn signals are to be emitted. Change this setting only while the amplifier is disabled.

Baud rate

Determines the serial transmission rate. Change this setting only while the amplifier is disabled.

ID	Function
0	200 kBaud
1	1.5 MBaud

SSI Clock

Determines whether the output level is normal or inverted. Change this setting only while the amplifier is disabled.

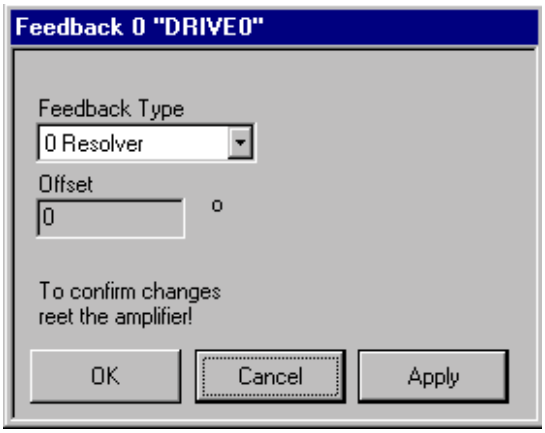
ID	Function
0	Standard
1	Inverted

SSI Code

Determines whether the output is in binary or GRAY code. Change this setting only while the amplifier is disabled.

ID	Function
0	binary
1	GRAY

2.19 Screen page «Feedback»



Feedback type

ID	Function	Comments
0	Resolver	The linear axes have two-pole hollow-shaft resolvers fitted as standard. **Cycle time 62.5 µs.** The settings have been made at the factory.
4	EnDat	As an option, the linear axes are available with high-resolution absolute encoders (multi-turn) with EnDat interfaces (Heidenhain) as feedback, **Cycle time 125 µs.** The settings have been made at the factory.

Offset If an encoder with EnDat is used as a feedback unit, the offset is automatically transmitted to the servo amplifier.

3. Appendix

3.1 Abbreviations and acronyms

The table below shows abbreviations and acronyms used in this manual.

Abbreviation / acronym	Explanation
BTB/RTO	Ready for operation
CE	Communité Européenne (European Community)
CENELEC	European electrotechnical standards coordinating committee
COM	Serial interface of a PC-AT
DIN	German technical standards organisation (Deutsches Institut für Normung)
Disk	Magnetic storage (diskette, hard disk)
EEPROM	Electrically erasable and programmable read-only memory
EMV	Electromagnetic compatibility
EN	European standard
IEC	International Electrotechnical Commission
ISO	International Standardisation Organisation
LED	Light Emitting Diode
MB	Megabyte
MS-DOS	Operating system for PC-AT
NI	Zero impulse
NSTOP	Limit switch input, anticlockwise rotation
PELV	Protective low voltage
PSTOP	Limit switch input, clockwise rotation
RAM	Volatile memory
ROD	Inkrementelle Positionsausgabe
SPS	Programmable logic controller PLC
SSI	Synchronous serial interface
V AC	Alternating voltage
V DC	Direct voltage
VDE	Association of German electrical engineers
VDI	Verein deutsch Ingenieure

3.2 Glossary

E	EEPROM	**E**lectrically **E**rasable and **P**rogrammable **R**ead-**O**nly **M**emory Electrically erasable memory in the servo amplifier. Data stored in the EEPROM is not lost when the auxiliary voltage is switched off.
	E^2PROM	See EEPROM
	Enable	Enable signal for the servo amplifier (+24)
	Ipeak, peak current	Effective value of peak current
	Irms, effective current	Effective value of continuous current
	Reset	Restart of the micro processor
	ROD interface	Incremental position output
C	Current controller	Controls the difference between current setpoint and actual value of the current to 0.
G	GRAY format	Special form of binary code (with only one bit changing between sequential numbers)
H	Holding brake	Motor brake which must only be applied with the motor at a standstill.
I	I^2t	Monitoring of the effectively required root-mean-square (RMS) current
I	Intermediate circuit	Rectified and smoothed output voltage
M	Motion block	Data packet with all position control parameters which are required for a motion task.
O	Optical coupler	Optical connection between two electrically independent systems
P	Position controller	Controls the difference between position setpoint and actual value to 0.
R	RAM	**R**andom **A**ccess **M**emory Volatile memory in the servo amplifier. Data stored in RAM are lost if the auxiliary voltage is switched off.
S	SSI interface	Cyclically absolute serial position-output
Z	Zero pulse	Is issued once per revolution by incremental transmitters; it is used for zeroing the machine.

3.3 Index

MONTECH AG
Gewerbestrasse 12, CH-4552 Derendingen
Fon +41 32 681 55 00, Fax +41 32 682 19 77
info@montech.com, www.montech.com